

TANDY LAPTOP COMPUTING

APRIL 1990 -VOL. 7, NO. 4

TERRY KEPNER

# portable 100

A MONTHLY PUBLICATION (EXCEPT COMBINED JULY/AUGUST ISSUE)

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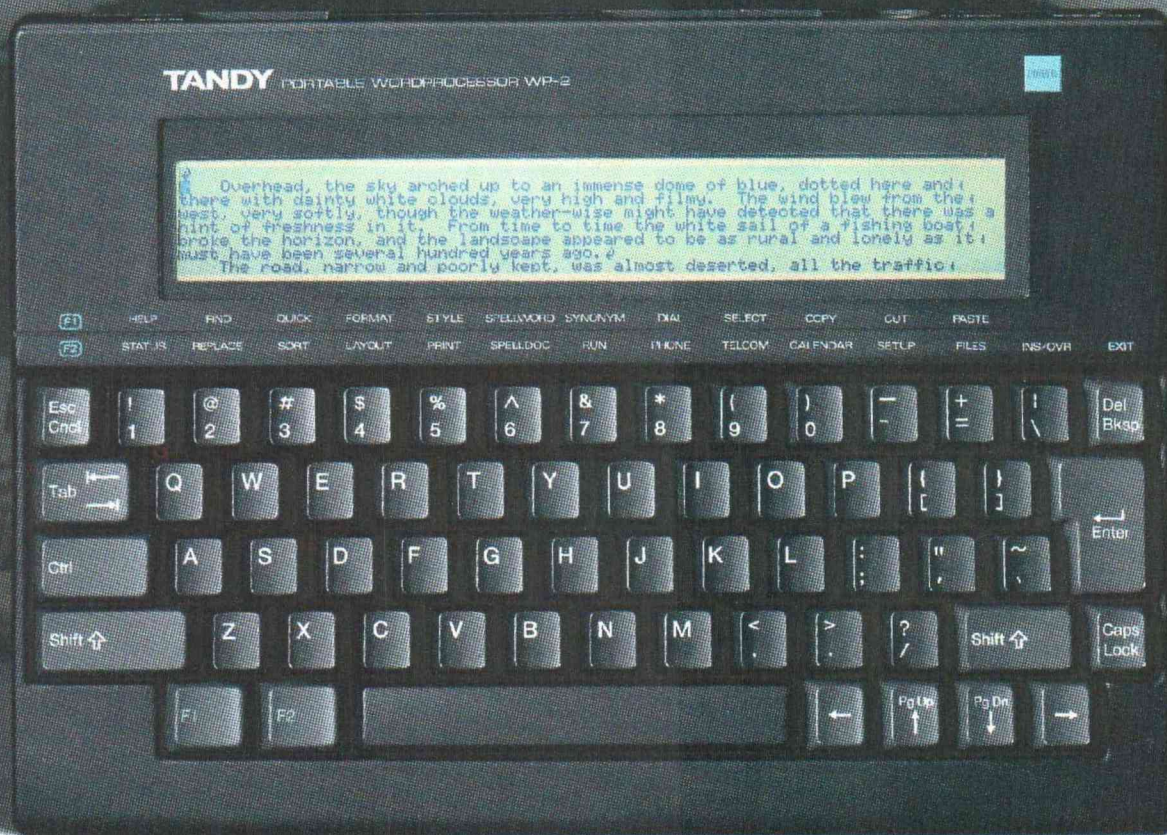
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ON  
THE  
COVER:

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used in a film editing  
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## ROM WITH A VIEW

**T**hough Space Shuttle Columbia is still on the ground, with luck, when you read this she'll have "slipped the surly bonds of Earth," carrying the Shuttle Amateur Radio Experiment (SAREX) spaceward. As I explained last month, I'm eager to contact Columbia via amateur ("ham") packet radio with my Model 100. I hope the delay has given you time to set up your own packet system so you can participate, too. (You needn't be a ham to receive packet signals!)

Any computer with a serial port can operate packet, but it seems especially fitting to use the Model 100. This little I/O box was once the computer of choice for Shuttle missions, and SAREX was originally designed with the M100 in mind. The Challenger disaster, however, postponed the SAREX mission, and in the interim a Grid laptop became the Shuttle's new general purpose computer.

Still, ain't it nice to know that NASA holds our low-tech "toy" in such high regard? There's a reason: The Model 100 is simple and sturdy, yet versatile. It does its job well. Unfortunately, lacking the bells and whistles that folks find attractive, it has more or less fallen by the wayside.

Take amateur radio, for example. As ham radio became computerized, the Model 100 found many popular uses: logging, Morse code, radioteletype, packet radio, and more. But its programs, written in *BASIC*, were slow and RAM-hungry, and screen size and memory were limited. Eventually, more "capable" computers began to take its place.

Well, phooey! All too often their "capability" derives more from "lotsa RAM" than anything else. Big, sloppy programs do work, after all, and with enough memory and processor speed, even the worst piece of—er, software—can appear to perform well, pretty pictures included. But that requires big, expensive (and fragile!) computers, doesn't it? What could we accomplish with just Model 100's, good programming skill, and common sense?

Nowadays we know how to program ROM's, leaving our RAM free. And we can increase that RAM to quite usable levels with products available now. Screens can already display 60 columns by 10 lines. "Pretty pictures?" I've seen marvelous graphics from Neil Wick and others, all done in a mere fraction of the 640K that "real" computers require. Light weight, simplicity, long battery life, and durability in harsh environments make the Model 100 especially suitable for portable and emergency work.

Others agree. PacComm is developing a TNC that fits inside the Tandy 100/102! I've tested a beta unit, and it's great. Connect a cable from the M100 directly to a radio and—voila!—on the air! When the final version comes out, I'll grab one for myself and tell you all about it. (Meantime, they have a complete line of TNC's. Their tiny HandiPacket is ideal for the Model 100.) Contact Gwyn Reedy at PacComm, 3652 West Cypress Street, Tampa, FL 33607. Phone (813)874-2980. Tell him I sent you, and give him lots of encouragement!

If we'll apply our collective talents to better use its capability, the Model 100 will remain a serious contender. As NASA knows, there's room for low-tech in high places. Ladies and gentlemen, start your assemblers!

-Nuge

## Toolbox

Manuscripts were typed into Microsoft Word 3.0 on a Tandy 1400 HD, where they were edited, spell-checked, and had basic format instructions inserted. From there they were loaded into a Tandy 4000 (80386 CPU, Tandy EGA Monitor, Tandy LP-1000 LaserPrinter) desktop computer and placed into Aldus' IBM PageMaker 3.01. Once there, design decisions on photo, figure, and listing sizes and placements were made. Here, pull quotes are placed, headlines, intros, and bylines are sized and positioned, and advertisements positioned.

Normally, the Tandy LP-1000 is capable of emulating only a Hewlett Packard Laser Printer Plus, but with the

addition of the Destiny Technology Corporation (300 Montague Expressway, Suite 150, Milpitas, CA 95035. (408) 262-9400) PageStyler 4.5MB kit, the LP-1000 is turned into a fully-compatible PostScript printer, with all 35 native fonts that are found in the Apple LaserWriter Plus printer. The Destiny PageStyler is available through the Tandy Express Order Hardware system.

Page previews were output from the Laserprinter. When everyone was satisfied with the appearance, final pages were output and artwork and lineart ads were positioned. The finished magazine was then delivered to the printer, who printed it, labeled it, and mailed it to you.

TERRY KEPNER'S

## portable 100

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**Circulation**  
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**Bulletin Board**  
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(300/1200—8, None, 1)

*Portable 100* (ISSN 0888-0131) is published by Portable Computing International Corporation, 145 Grove Street Ext., P.O. Box 428, Peterborough, NH 03458-0428. *Portable 100* is an independent journal not connected with any hardware, software, or peripheral equipment manufacturer. *Portable 100* is published monthly, except for a combined July/August issue in the summer. Entire contents Copyright © 1990 by Portable Computing International Corporation. All Rights Reserved. No part of this publication may be reproduced without written permission from the publisher. Portable Computing International Corporation makes every effort to assure the accuracy of articles published in *Portable 100*, but assumes no responsibility for damages due to errors or omissions. Subscription Service: All subscription correspondence should be addressed to *Portable 100*, Portable Computing International Corporation, 145 Grove Street Ext. P.O. Box 428, Peterborough, NH 03458-0428. U.S. subscription rates: \$19.95, one year; \$34.95 two years. Canada and Mexico: US\$24.95, one year; US\$44.95 two years. All other foreign (surface mail): US\$39.95, one year; US\$74.95 two years. Foreign Air Mail, add US\$50 per subscription year. All payment, except Canada, U.S. funds drawn on U.S. Bank. Second-class postage paid at Peterborough, NH 03458, and at additional mailing offices.

POSTMASTER: Send address changes to: *Portable 100*, Portable Computing International Corporation, 145 Grove Street Ext., PO Box 428, Peterborough, NH 03458-0428.



## FILL ME IN!

**R**e: your recent subscription solicitation. I want to know everything that "Portable 100 readers know." Please be sure I get filled in on the scoop related to all the teasers in your sales pitch.

Does Wayne Green have anything to do with P100? Peterborough (in your address) and your approach lead me to think so.

Let's bring my "high-tech paper-weight" back to life!

**Steve Grantham**  
Ellisville, MS

Terry Kepner and partners bought PICO magazine from Wayne Green, and I do editorial consulting for Wayne's 73 Amateur Radio. He's a good friend and sometimes advisor whose only connection to Portable 100 is that he subscribes. (And of course, whenever he needs the best advice about his many Tandy, NEC, and Olivetti notebook machines, he comes to us!)

Wayne uses his Model 100 almost constantly. He was recently featured in the premiere issue of Mobile Office magazine (CurtCo Publishing, Woodland Hills, CA), and three of the article's four photos show him with M100 in hand.

As for the stuff P100 readers know already, you'll find it in scads of back issues (see order form elsewhere in this issue), and for the stuff they don't know yet ... well, that's why they—and you—subscribe. Welcome aboard, Steve!

-MN

### MEMORY MAPS?

A month or so ago I received your advertisement that you exist and some of the values of having your magazine. I did not respond at that time.

I have watched other computer owners as they tried and kept or canceled magazines, software, etc., for their computers. Unless your magazine is uniquely different than other magazines I have seen, it probably won't be of much value to me.

I am interested in BASIC and Assembly language, not games or business accounting. What would be of value to me—and I would be willing to pay a reasonable sum for it—is a MEMORY MAP for the portable Tandy 102 laptop computer. Would you believe that not even

the Tandy Computer Center could help me?!

I have analyzed the memory of my Tandy 102 laptop and have identified the storage address of stored files, current program, last line edited, last line typed, last numeral printed on the screen, etc. A mere beginning.

If this request for help in finding an ACCURATE memory map for my Tandy 102 is not ridiculous, please respond.

**Ann Ellen Nichols**  
Fresno, CA

We think we're unique, Ann. As the only magazine for Tandy laptops, our readership is quite diverse, so we try to cover as many areas of interest as possible in the space we

## Would you believe that not even the Tandy Computer Center could help me?

have. Thus, you'll get a mix of things, but almost always something you can use. Now to "address" (sorry!) your request:

Two books, "Hidden Powers of the TRS-80 Model 100" and "Inside the Model 100," are excellent companion references. "Inside" is available from Granite Street Portables, and "Hidden Powers" from Ultrasoft Innovations (see their ads).

A group of files known as the Covington maps is available on our Portable BBS (and also split between the Jan. '90 and Feb. '90 P100-To-Go disks—some on each). These RAM/ROM maps are the most comprehensive I've seen and are generally quite accurate. Our BBS is free, and you're welcome to use it anytime. Fellow users with similar interests will likely offer additional help and enjoyment. See our masthead for phone number and TELCOM stats. Other online

services like CompuServe and GENie have even more files and some very knowledgeable users.

Portable 100 back issues contain much good info. For example, when the Tandy 102 replaced the Model 100, Carl Oppedahl compared their ROM and reserved RAM areas ("Weighing the Differences," Aug. '87). By the way, for all practical purposes their minor differences can be ignored. Back issues and/or photocopies of articles are available (see page 7 for info).

Assemblers, compilers, and other software tools are available from our advertisers, and some can be downloaded for free from private and commercial BBS's.

That ought to keep you busy for awhile. Welcome aboard!

-MN

### GOON SQUAD NOW FORMING!

After seeing the letter about the Safeskin keyboard protector in the January '90 issue, I sent off to the Merritt Company for ordering info. Incidentally, I gave them a stern going-over for not advertising in P100. Hopefully, a few other readers did the same. Maybe we need to form up an active duty Goon Squad and strong-arm some of these guys into financing thicker issues for us.

Congrats on the fine job you guys are doing with the mag. Now let's see that sucker get a bit more hefty every month.

**Ronald K. Caldwell**  
APO New York, NY

Thanks, Ron! It really helps when readers tell the vendors what they want. We became four pages thicker with last month's issue. If your goons do a good job, we'll do ours!

-MN

### 1100 FD PRO AND CON

In the January '90 issue of Portable 100 I found a number of unfair criticisms leveled against the new Tandy 1100 FD computer. Since I purchased an FD almost a month ago and have used it extensively, I simply had to write to refute these misstatements.

As one who types for a living, I have to agree with the criticism that the FD keyboard does not have the best feel in the world. However, after a month of relatively heavy use, I would say the keyboard feel is more than adequate. I still



## Int/Ext's for Laptops/Desktops

prefer the feel of the DataDesk 100 keyboard on my Macintosh, but that keyboard cost me \$150. You really can't expect Tandy to spend that much money on one component of a \$999 computer.

Despite criticism, I would describe the FD's display as excellent. It is readable from side angles and has very good contrast. One writer critically described the display as having a dark green background. Mine is dark green only when misadjusted. When adjusted for maximum contrast, my display has a gold/light green background. If you really want to see a poor display, I suggest you view the Toshiba T1000.

I bought the FD because I wanted the Model 100 advantages—light, compact, long battery life—with a display that would show more lines with more characters. The FD satisfies this display requirement, and displays 21 lines of 80 characters. Unfortunately, the FD is relatively heavy (about 6.5 pounds). And it's battery life is five hours—a far cry from the Model 100's 20 hours. I can replace the drained battery with a charged one, but that isn't much of a consolation prize.

Below, I have listed some of the other advantages and disadvantages of the the FD that I didn't see mentioned in the January issue:

**Advantage:** the built-in *DeskMate* interface, copied from the Macintosh, which is familiar to me since I use Mac's. It even mimics the Mac's menus and optional single-key menu selection. The *F10* function key lets you run small programs while running another program, a feature pioneered on the Mac.

**Advantage (?)**: a user can attach a mouse or joystick. I don't see this as an advantage, since it would change this laptop to a portable requiring larger working area. And a color display (!) can be added. I didn't realize color LCD displays were available for laptop computers, but what other type would be used with a laptop?

**Advantage:** The FD comes complete with the following programs: word processing (built-in), telecommunications (two programs), spreadsheet, database, a Hypercard-like program, calendar, scheduling, and drawing. These can be added to, deleted from, or moved around on the *DeskMate* startup screen—just like the Mac. Help files for each can be accessed at any time.

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**Advantage:** the FD stores word processing documents as text files, so I don't have to do any file conversions before transferring files between computers. I currently use *Telecom* transfer files between my FD and Macs at 1200 baud. *Telecom* allows 9600 baud, but presently I get gibberish at that speed.

**Disadvantage:** The word processing cursor is an almost invisible blinking vertical line. To find it, I have to press the *INS* (insert) key to change the cursor to a blinking square, then press *INS* again once I've found it.

**Disadvantage:** A slide-out carrying handle would have been a great feature. Tandy's new \$50 universal carrying case serves as a pretty fair substitute.

**Disadvantage:** Nowhere in the documentation or tutorial does it tell how to copy individual files from one disk to another. I finally figured out that if you pretend you are copying files to a non-existent B: drive, the FD realizes you are trying to copy a file and prompts you when to insert the proper disk.

Those inclined toward masochism can switch off the *DeskMate* interface (temporarily or permanently) and use the FD as a pure MS-DOS machine.

All in all, I would rate the FD as the most impressive computer in its price range. I shopped around and didn't see anything to compare with it. All the other computers boot MS-DOS from disk, and then access the disk to run a word processing program. That slows things down considerably and also eats into the already short battery life.

I'm old enough to remember paying about \$600 in 1981 for the 64K bytes of RAM in my Apple II+ computer. Nine years later I'm getting 640K for \$999—and Tandy is throwing in a computer in the bargain.

What more could anyone want?

**Bob Leahy**  
the LEAHY newsletter  
Tustin, CA

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The Model 100/102 version of the

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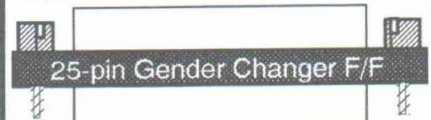
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**BASIC** mouse test program ("A Better Mouse Trap," Feb. '90) needs a slight correction.

To get the mouse to run on a M100, change—the last *DATA* item on line 9380 from 78 to 30. Now you're on your way to creating your own mouse program!

The same mistake is reflected in the assembly source listing for assembling the M100 version: *LXI H,054EH* should be changed to *LXI H,051EH*, due to the different bit position arrangements of the serial port configuration in the M100.

And one more: *SHLD CCSTRIP* should be omitted for the M100, or just nullified by surrounding it with *IF VER=200* and *ENDIF*.

Perhaps you can mention this needed correction somewhere in the next issue?

**James Yi**  
**CompuServe (73327,1653)**



# The Wizard Of DOS

## Part 3

**I**n Part 1, our clumsy hero Michael Daigle falls off his porch during a storm and winds up mysteriously transported to the corporate headquarters of the mystical Emerald Enterprises. He finds himself armed only with a backpack containing his trusty Model 102, called a "Tote-02" in this strange alternate reality.

Help arrives (more or less) in the form of N.A. Countit, a small spreadsheet worker (number cruncher) known as a "Crunchkin." Alarmed by the realization that his customary sneakers have somehow been replaced by Florsheim high gloss wing tips, Michael realizes that he must escape quickly or become a permanent fixture there. To complicate matters, he and N.A. (who has made the fatal mistake of wearing the wrong tie that day) are being pursued by Mr. Reemer, the ruthless Head Of Corporate Conformity (known as the Wicked Snitch In A Vest).

In Part 2, Reemer and his horde of simpering "yes-men" have captured our boys. Holding N.A. hostage, Reemer tries to force Michael to beta test the new nuclear powered Toshiba Gargantuan Mark 12 laptop computer. A freak accident saves Michael and permanently ends the career of Reemer. A joyful workforce celebrates, and N.A. takes Michael off to meet the Wizard.

And now, the soul-stirring, star-studded, 100% pure and natural conclusion of "The Wizard Of DOS!"

### THE WIZARD OF DOS—PART 3:

"Here we are," he whispered.

We stood before the huge double doors of the outer office of the head of Emerald Enterprises. The doors slowly opened by themselves, revealing a long corridor. A man was approaching from the far end.

"That's Nicholas Rhode, the Personal Assistant to the Wizard."

"The Wizard?"

"That's what everyone calls The Boss," N.A. explained, "because he was so young when he made his first million by inventing programming or computers or something like that. He's real

smart. If anybody can get you home again, he can.

"I hope so." The man named Rhode was getting closer. "Well, N.A. old pal, I guess this is it."

"I guess so. You saved us all. I want you to know that we'll never forget you ... uh ..."

"Michael."

"Yeah, right, whatever. There you go." He pointed over my shoulder. I looked. The other man was waiting halfway down the corridor.

"What do I do?" I asked.

"Just follow that fellow Nick Rhode."

"What?"

"Follow that fellow Nick Rhode."

I was distracted by an overpowering sense of *deja vu*. N.A. made shooing

---

*The inner sanctum  
was large and dark.*

---

motions with his hands and moved me toward the corridor.

"Follow, follow, follow, follow, follow that fellow Nick Rhode."

"Ok, N.A., jeez, don't have a cow!"

I turned and headed down the corridor. Three steps before I reached him, Rhode turned smartly on his heel and goosestepped down the long hallway ahead of me. I half expected to hear him say "Walk this way," and I spent the next couple of minutes inventing snappy comebacks just in case. It never happened; he didn't say a word.

Somewhere along the way, I noticed that my old clothes were back! The jeans,

the sneakers, even my beloved Bart Simpson sweatshirt. I took this as a good omen.

Finally, we came to the end of the corridor before a pair of monolithic doors that looked like they were fashioned from battleship armor. We stopped.

I looked over at Rhode. He was a distinguished figure, tall, with just the right touch of gray at the temples, impeccably dressed in a tailored dark blue suit that looked like it cost about five dollars more than my house. Something in his demeanor reminded me of the stereotypical British valet.

He turned and faced me. Our gazes locked. His eyes shone with an intelligence tempered by warmth and humor. Suddenly, I knew that some vital piece of knowledge was about to be transferred to me. Somehow I sensed that the benefit of his years of experience in this place and in his life were about to be distilled into a sentence or two of perfectly delivered Queen's English which would hit me with the telltale impact of a Great Truth, ripping away the blindfold of my own feeble understanding and securing to me an insight so profound that my entire life would be changed forevermore!

He opened his mouth and, in a voice that sounded like a trash compactor forcing helium out of a rusty bagpipe, he squeaked, "Have a nice day." Then he turned and walked away.

So much for profound insights.

A deep noise like the turning of huge ancient wheels drew my attention back to the towering doors before me. They slowly swung inward, apparently of their own accord. (They seemed real big on that particular special effect around here.) I walked in.

The inner sanctum was large and dark. Everything inside was reduced to black silhouettes in the vague light. In the center of the room was a box-like shape that I couldn't quite make out.

"Uh ... hello?" I said into the dusk. "Is



# Portable 100 BACK ISSUES

With over 60 issues, and hundreds of articles, *Portable 100* is THE source for information, programs, and applications for your Tandy Portable Computer. But how do you find what you need among all those issues? The answer is the **updated Portable 100 Article Index**. Covering every issue from September 1983 to the combined summer 1989 issue, the index is designed to make it simple for you to find what you need. And at a cost of only \$9.00 (postage and handling included), you should buy one today! If you have last year's index, don't despair. Update your index by adding our special 1988-1989 Update Index. It's a bargain at just \$4 (P&H included).

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anybo—"

The box-shape sprung to life with a brightness that almost hurt. The image of a skinny white guy with glasses and Rastafarian dreadlocks floated before me.

"I AM THE GREAT AND TERRIBLE WIZARD!" his voice thundered from all around me.

I was trying to decide whether to wet my pants or just go with the flow and have a stroke when the lights came up.

"Oh, hey, I'm sorry," he apologized. "Didn't mean to scare you!"

My eyes were adjusting to the light. Now the skinny guy was standing near me, wringing his hands worriedly, as if he couldn't think of what to do with my corpse if I decided to expire on the spot. "I thought it was Rhode—I love to pull that one on him. Are you all right?"

"I think I'll live," I said, although I wasn't willing to bet money on it just yet.

The box-shape turned out to be a colossal Sony multi-sync monitor. Expensive-looking speakers were ceiling mounted in all four corners of the giant office. On the monitor, the image of the white Rasta was frozen in mid-sentence.

I looked back at him. "Hi," he said, holding out his hand. "I'm Gil Bates. Everyone around here calls me the Wizard."

"So I hear," I said as I shook his hand. "Tell you what," he said. "You can call me Wizzy." Then he held up the dreadlocks he had been wearing when he fed his image into the monitor. He shook them at me. "That means this is a ..." he trailed off expectantly, waiting.

I stared back at him blankly.

He broke into a huge grin. "... A Wizzy-wig!" Then he laughed till his eyes watered.

Great. A lunatic.

"Sorry, sorry," he said, holding his ribs and catching his breath. "That just cracks me up. Whooo." He fanned his face with his hand. "Pulled that on Don Jvorak after a press conference a couple of weeks ago, after he had a few drinks in him. He laughed till he puked! God, that was great!"

He finally noticed I wasn't laughing and sobered up. "Look. Come on over here and sit down; we'll talk."

You know the giant redwoods in northern California? The ones so big

they've actually cut tunnels in them that you could drive your car through? Bates' desk looked like it had been carved from one.

He sat down behind the desk and touched a button. A monitor and keyboard silently rose from hidden recesses in the desktop. "Rhode gave me a brief overview of recent events just before you arrived. Just give me a second to scan the E-mail from my department heads and get up to speed on this situation."

I looked around. Lining the walls were countertops jammed with every type of computer, monitor, and printer that you could imagine. Well, I corrected myself, almost every type. I thought of the Model 102 in my backpack.

"Oh, this is terrible," he said, reading from the monitor. He looked up at me. "I had no idea Reemer had gotten so far out of hand. I've been so busy lately ..."

"Look, Mr. Bates—"

"Gil," he said absently, punching keys so fast his fingers blurred, and staring intently at the monitor.

"OK, Gil, look, I'm sorry about

Continued on page 30.



# The WordStar Conversion

*Edit WordStar files on your Model 100.*

*by John LaTorre*

If you're one of the thousands of people who use *WordStar* on their desktop computers, you've probably thought about how nice it would be to transfer text files back and forth between your Model 100 and your other computer. It's as easy as getting or building a null modem cable (a fancy name for a very simple cable), connecting the serial ports of the two machines together, and transferring files using *TELCOM* and your favorite communications software.

Well ... almost that easy.

The problem is that *WordStar* uses a different method of storing characters than *TEXT* does. Using a disk editor, I eventually found out how *WordStar* actually stored its document files on the disk, and wrote a short *BASIC* program to convert files created by *WordStar* (or its clone *NewWord*) into a format that *TEXT* can use.

## WORDSTAR-TO-TEXT ...

(In this article, *WordStar* refers to *Wordstar* v3.3, although other versions may work with *CONVRT*. I haven't tried them.)

When you download a *WordStar* document file from your

## WordStar has a strange way of storing the contents of a text file.

desktop CP/M or MS-DOS computer, you'll notice that *WordStar* has a strange way of storing the contents of the file. At first, it looks like the gibberish you usually get from a bad modem connection, but soon you notice that there's a method in the madness. Most of the text goes through unscathed. At the end of each word, though, there's a special graphics character instead of the one you typed originally. For instance, the character "d" in the word "good" has been replaced by a little square box. These two characters are actually close relatives, although they don't look it. To understand why, let's see how the computer tells the difference between the two.

When the letter "d" enters those innards of the computer that I do not presume to understand, it is converted into a

```
5 ' WordStar-TEXT File Conversion Program by John LaTorre
10 PRINT "Conversion Program v. 1.0"
20 CLEAR 20000:MAXFILES=3
25 ON ERROR GOTO 200
30 FILES
40 INPUT "name of text file";FN$
50 CLS:PRINT "Converting...":OPEN FN$ FOR INPUT AS 1
60 OPEN "buffer" FOR OUTPUT AS 2
70 IF EOF(1) THEN 160
80 C$=INPUT$(1,1)
90 IF ASC(C$)=46 OR ASC(C$)=174 THEN PRINT "*";
100 IF ASC(C$)=10 OR ASC(C$)=31 OR ASC(C$)=141 OR ASC(C$)=160 THEN C$="":GOTO 70
110 IF C$=CHR$(13) THEN PRINT#2,:GOTO 70
120 CV=ASC(C$)
130 IF CV>127 THEN CV=CV-128
140 PRINT#2, STRING$(1,CV);
150 GOTO 70
160 FN$=FN$+".do"
170 KILL FN$
180 NAME "buffer.do" AS FN$
190 BEEP : MENU
200 IF ERR<>52 AND ERR<>55 THEN PRINT "Error ";ERR;" in line #";ERL:STOP
210 PRINT "I can't find ";FN$;". "
220 PRINT "Press <M> to return to the Main Menu,"
230 PRINT "or any other key to try again ."
240 A$=INKEY$:IF A$="" THEN 240
250 IF A$="m" OR A$="M" THEN MENU ELSE GOTO 20
999 END
```

Listing 1. *CONVRT.BAS* makes *WordStar* files compatible with Model 100 *TEXT*.

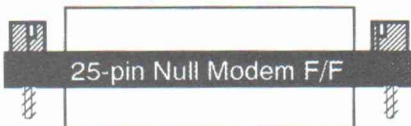
pattern of eight bits, together representing the binary value 01100100. This value is equivalent to the decimal value of 100 (and also the hexadecimal value 64, but let's not get into that). All computers that use the ASCII character codes recognize 01100100 as a "d," because the ASCII values have standardized meanings to allow one computer to communicate to another.

All the standard ASCII characters (which comprise alphanu-



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meric characters, punctuation marks, and control codes) can be described in seven bits, because there are only 127 of them. The eighth bit (which is actually the leftmost in the series) is set at zero in an eight-bit system. Trust me on this.

The creators of *WordStar* saw that unused bit, and found a way to put it to work. They needed a means of telling their program how to find the end of a word, so they programmed *WordStar* to mark the last letter of each word by setting the eighth bit of that character to "1" instead of zero. In our example, "d" with a binary value of 01100100 (100 decimal) becomes what the Model 100 understands as "little square box," a special graphics character with a binary value of 11100100 (228 decimal). This process is called "setting the eighth bit high."

When *WordStar* is using the file, it hides this change from you by converting "little-square-box" back to "d" when it displays the character on the screen or sends it to the printer. But when you send the *WordStar* file to your Model 100 and open it with *TEXT*, you'll find all those graphics characters sitting at the end of their respective words.

You'll see other characters that *WordStar* uses, but hides from you when it displays or prints your document. One is the plus-minus symbol, corresponding to the ASCII value 241. That's the high-bit version of the familiar carriage return. *WordStar* uses it to denote a "soft" carriage return which it inserts automatically as you type to the end of a line. The low-bit "hard" carriage return is reserved for the end of a paragraph—it's the return you get when you hit the *ENTER* or *RETURN* key.

Two other *WordStar* characters are a "soft" space, inserted to make the left and right margins line up, and a "soft" hyphen, which tells the program where to split a word if that word should happen to overflow a line during a reformatting session. *TEXT*, the Model 100's built-in word processor, doesn't recognize these characters as anything special and therefore displays them as graphics characters. If you want to use your *WordStar* file with *TEXT*, you've got to convert it to *TEXT*'s format.

It's true that programs are available that set that eighth bit back to zero. These programs convert all those "soft" hyphens, spaces, and carriage returns back to "hard" ones, which is great if you want to send your finished text off to some

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```

100 ' TELCOM.BA by Alan L. Zeichick
110 ' Revised listing by John LaTorre
120 ' Memory locations used:
130 ' 63066 -- If = 0, then no LF
140 ' If = 1, then LF
150 ' 20806 -- Starts TELCOM
160 '
170 KEY 8, "Menu"+CHR$(13)
180 '
190 ' screen display
210 CLS
220 PRINT @ 10, "TELCOM Pre-execution Men
u"
230 PRINT @ 50, "Automatic Line feed is "
;
240 IF PEEK(63066) THEN PRINT "On " ELSE
PRINT "Off"
250 PRINT @ 130, "Esc -- Toggle LF"
260 PRINT @ 170, "Enter -- Telcom"
270 PRINT @ 210, "F8 -- Main Menu"
280 '
290 ' Input handling
310 AS=INKEY$
320 IF AS="" THEN 310
330 IF AS="M" OR AS="m" THEN MENU
340 IF AS=CHR$(13) THEN CLS:CALL 20806
350 IF AS<>CHR$(27) THEN 310
370 IF PEEK(63066)=0 THEN POKE 63066,1 E
LSE POKE 63066,0
380 GOTO 230
    
```

Listing 2. Revised version of Alan Zeichick's TELCOM.BA (Portable 100, Nov. '88) toggles linefeeds on and off in TELCOM (Model 100/102 only).



computer that doesn't speak *WordStar*. But if you intend to do more writing, editing, and re-formatting, those hard characters will come back to haunt you unless you can eliminate them from the text.

That's what the *CONVRT* program is for. The program goes through the file, character by character. If the character is a "soft" carriage return, line feed, a "soft" hyphen, or a "soft" space, *CONVRT* throws it out, because *TEXT* won't use it. It retains the hard carriage returns, since *TEXT* uses the same symbol for the same purpose.

If the character is anything else, *CONVRT* examines the eighth bit. If it's high, it converts the character to its low-bit equivalent; otherwise, it leaves the character as it is. Then it prints the character into a temporary file and goes back for another character. When the end of the file is reached, the original file is erased and the temporary file, ready for *TEXT*, is given the original file's name.

*CONVRT* has one drawback I haven't found the cure for. Since it creates a temporary file while processing the first one, it requires that you have an amount of free RAM equal to the size of the original file. If you run out of memory, it will display an *Error 7* message (the Model 100's arcane way of saying it ran out of RAM), but won't harm your original file. You'll have to press *SHIFT/PAUSE* to break the program, type *FILES* to get a list of your files in RAM, kill enough files to free up the memory *CONVRT* needs, and press *F4* to run the program again.

Here's how the program works:

Lines 5-30 set the stage, so to speak, by giving you the program's title, clearing the machine's memory of previously assigned variables, and presenting you with a list of files to choose from. In line 40, you make your selection, which Line 50 confirms with a *Converting...* message. It then opens your chosen file and creates a new file, called *BUFFER.DO* to store the converted file in.

Lines 80 to 150 do the actual conversion work, as described above. Line 90 actually isn't necessary at all. I put it in there so the computer would show me it was actually doing something as I waited. It prints an asterisk (\*) on the screen each time it encounters a period in the text. By substituting one of the Model 100's graphics characters for the asterisk, you can have your program mark the passing sentences with a parade of little telephones, checkerboards, squares, hearts, or any other character you can generate with the *CODE* or *GRPH* keys. If you want to speed up the program by

roughly 10 percent, just delete this line altogether. On the other hand, if you absolutely must know far along *CONVRT* is at any time, and don't mind slowing the program down by 50 percent, delete line 90 and add the following line:

```
PRINT STRING$(1,CV);
```

*CONVRT* will then display the contents of the temporary file as it works.

Lines 90 to 110 contain the command *ASC(C\$)*, which doesn't appear in the Model 100's documentation but is a valid command nonetheless. I found it in the documentation for the version of Microsoft *BASIC* I got with my Kaypro. Desperate for a means of converting a character to its ASCII value, I tried it on the Model 100, and it worked! How many other undocumented *BASIC* commands are lurking in my laptop's ROM?

Lines 150 to 180 erase the original file and replace it with the converted ver-

## Converting *TEXT* files into document files that *WordStar* can use doesn't require a *BASIC* program.

sion. The program then honks the horn, to let you know it's done, and returns you to the main menu.

The rest of the menus are for handling input errors. If you give the program a file name it can't find, it gives you the choice of trying again or returning you to the menu.

This is a bare-bones program, with no eye-dazzling graphics or fancy options. It was designed to be small enough to be kept in RAM and easy enough to customize to your own likes. And because it doesn't make any calls to your laptop's high memory, it should work with the Model 200 and 600 as well as the 100. With *CONVRT*, adapting a *WordStar* file to your laptop will be as easy as typing the file's name.

### USING *CONVRT*

To use *CONVRT*, you first load the text file from your desktop computer into the laptop. Here's how: Connect the

serial ports of your two machines together with a null modem cable. (Your dealer sells an adapter to convert an ordinary RS-232C serial cable to a null modem cable. It's Radio Shack part number 26-1496.) On the desktop, load your favorite communications software. On the laptop, run *TELCOM*. Make sure the two machines are using the same communication parameters. This ensures that each of them are "speaking the same language" and sending information in a format that the other one can understand. (See the article "GETTING WIRED," *Portable 100*, Nov. '88.) Use *TELCOM*'s *Stat* command to adjust the parameters to agree with those of your desktop computer's program, then press *F4 (Term)* to go into terminal mode. If the label above *F4* reads *Half*, press it again to switch to *Full*. Then press *F2 (Down)* to "download" a file. When it asks *File to Download?* enter the name you want the file to have while it resides in the laptop. It doesn't have to be the same name *WordStar* stores it under, but it is limited to six letters. *TELCOM* will automatically add a *.DO* extension. Now *TELCOM* is ready to accept the file.

With your desktop program, you're on your own, because I don't know which of the scores of programs you happen to be using. But there should be a way of going into terminal mode, setting the parameters to match that of the laptop, and "uploading" your text file. If you can't, there's something seriously wrong with the program. Yell for help. Call up and berate the dealer who sold you the program. Find somebody who uses the same program on a regular basis, and have it explained to you. But don't lose faith. There is a way.

When the file transfer is complete, press *F8* on the laptop twice to get back to the main menu. Your transferred file should be there. Now run *CONVRT*. Give it the text file name when it asks for it, and take a break. When you return, your text file will be ready for *TEXT*.

### ... AND BACK AGAIN

To convert *TEXT* files into document files that *WordStar* can use, you don't have to write a *BASIC* program. The commands are already in *WordStar* (and in its clone, *NewWord*). But you will have to make one modification to *TELCOM*—toggling the sending of a line feed after each carriage return. To do so, enter *BASIC* and issue the following command (in this article, <CR> stands for "carriage return"—the *ENTER* or *RETURN* key):

```
M100/102—POKE 63066,1<CR>  
T200—POKE 61243,1<CR>
```



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NEC—POKE 62469,1<CR>  
KYO—POKE 63073,1<CR>  
OLLY—POKE 63069,1<CR>

(To turn linefeeds off again, change the 1's to 0's in the above commands.)

Portable 100/200/600's March '86 issue printed a short program by Alan L. Zeichick which attempts to make the same change [M100/102 only!—Ed.], and toggle the line feed on and off, as you desire. The only problem was that it didn't work. With a little effort, I was able to revise the program so it works fine, and have included it as Listing 2.

Once you've toggled the line feed on, you're ready to go. Hook the computers together and, with *TELCOM* at one end and your favorite communications software in your desktop machine, transfer the file to your desktop. The procedure is the same as above except for two things:

First, you want to have your desktop communications program ready to "download" the file when it comes in. It's kind of like throwing a forward pass; it doesn't make much sense to do it if you don't have a receiver there.

Second, instead of pressing F2 on the Model 100 to "download" a file, you want to press F3 (Up) to tell *TELCOM* to "upload" a file. Then give it the file's name, and press ENTER. When it asks for Width: don't give it a number. Just

press ENTER again.

When you open the file with *WordStar*, in document mode, you'll notice that your indents, made with the Model 100's TAB key, have been converted into eight-space indents. Also, the lines of text will run right off the screen, since there are no soft carriage returns. It's easy to correct these faults. We'll start with the indent.

If an eight-space indent is not your cup of tea, don't worry. *WordStar* was merely interpreting the Model 100's indent character, Control-I, as an eight-space indent command. *WordStar* usually stores indents in the form of spaces corresponding to whatever your first tab is set at, usually five. If you don't want eight spaces, simply replace the indent command with the proper number of spaces using *WordStar*'s search-and-replace function. At the beginning of the file, type ^QA. This tells *WordStar* to begin the search-and-replace function. When it asks Find what?, you answer: ^I<CR>. With this, you specify the indent character that you want to delete. When *WordStar* responds with Replace with?, you type as many spaces as you want your indent to be, and finish it with a <CR>. When *WordStar* asks for Option(s)?, you type NG<CR>, signifying that you don't want it to ask you for confirmation, and that you want the

substitution made throughout the document.

After all the replacements have been made, return to the beginning of your document with ^QR. (*NewWord*, unlike *WordStar*, will ask you to press ESC when all the replacements have been made. Do so, and then enter ^QR to go back to the beginning of the document.)

To restore the soft carriage returns and re-justify the copy, enter ^QQ^B (or, if you're using *NewWord*, enter ^QB) and your document will be re-formatted with soft carriage returns in the right places. Unfortunately, there's no way of getting the soft hyphens back, but since I don't bother to put them in until the document is finished and ready for printing, that's no inconvenience to me.

If you have a key redefinition program, you can make these steps even easier by putting the commands on a single key (or two keys, if you can't get your key redefinition program to recognize the ESC command that *NewWord* needs). Thus, you can make the conversions with just a keystroke or two. And what could be simpler than that?

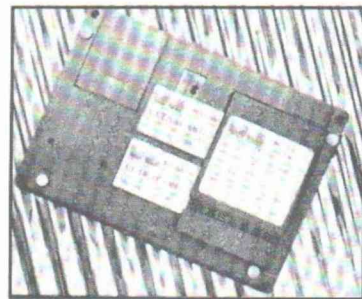
Note: *WordStar*, *NewWord*, CP/M, MS-DOS, and Kaypro are the trademarks respectively of MicroPro, Rocky Mountain Software, Digital Research, MicroSoft, and Kaypro Corporation.

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# Care and Feeding of the Family Hacker

*Remember—All is fair in love and war!*

*by Sharon Porath*

**I**t doesn't really matter *how* it happened. You may have married him with full awareness of his vice; maybe you were smugly convinced you could change him after the ceremony. Or maybe it only crept into your lives later, gradually and insidiously, beginning with the kids' Atari and taking over from there.

However it went, the results are the same. Your spouse is hooked, possibly for life, on that malevolent concoction of silicon and plastic. The computer—possibly even more than one—sits enthroned in its own piece of special furniture; and like a one-man dog, seems to obey commands only when they're entered by its master. An approach by anyone else is repulsed with alarmed beeps and sullen messages such as *ERROR READING DRIVE A*, the computer equivalent of "Say wha'?"

Worse, your man—the one who asked you to share his life—now seems to be sharing most of it with this malign intruder instead. The beau who whispered sweet nothings over the phone, whose photo adorned your dorm-room bulletin board, now has your home phone hooked up to a modem so he can spend his leisure time perusing computer bulletin boards. And you're reduced to keeping his photo attached to the refrigerator with a magnet, so you'll remember what he looks like.

The Apple has become forbidden fruit.

You've become (dare I say it?) ... peripheral.

## WHEN THE CHIPS ARE DOWN

Assuming you don't want to boot him out, you'll have to develop some strategies for remedying the situation. The first step toward sharing your mate's new interest is to learn the language. Sprinkling your conversation

INTERFACE: A connection. "I need to interface with you about Junior's report card."

ACCESS: To reach or enter. "I have to access your study for cleaning, before the Health Department shuts us down."

ASCII: American Standard Code for Information Interchange, used by most computers for data communications. We relate this best to the Biblical injunction "ASCII and ye shall receive."

PROGRAM: Sequence of coded instructions. "I heard about this great new program ..." will get his attention, and then maybe you can trick him into watching *Love Boat* with you.

This, of course, is only the tip of the iceberg. Hackers, programmers and plain computer nuts also have other, more elaborate languages, designed solely for talking to computers. All of these are, thank goodness, completely incomprehensible to ordinary sane people.

Just for information, we've included a couple of the most common languages

used by hackers, with the real explanation of what they mean:

BASIC: Baffling And Stupid Inexpl-  
icable Code

PASCAL: Puzzling And Scarcely Com-  
prehensible Atttempt at Language

## "disPARITY"

Sorry, dear, about our *.TIF*,  
I didn't mean to *dBASE* you ...  
Not even a little *BIT*.  
I hope this situation isn't *TERMINAL*;  
Please don't *BOOT* me out.  
It's really quite *BASIC*, dear,  
I love you very much.  
Can I *ASCII* to forgive me?

*by Toni E. Saddler*

with technical terms like "bit," "byte," and "parity" will cause him to look at you with new respect. Assuming you can get his attention at all.

For this reason, we are herewith including a brief glossary of helpful terms and suggested uses:



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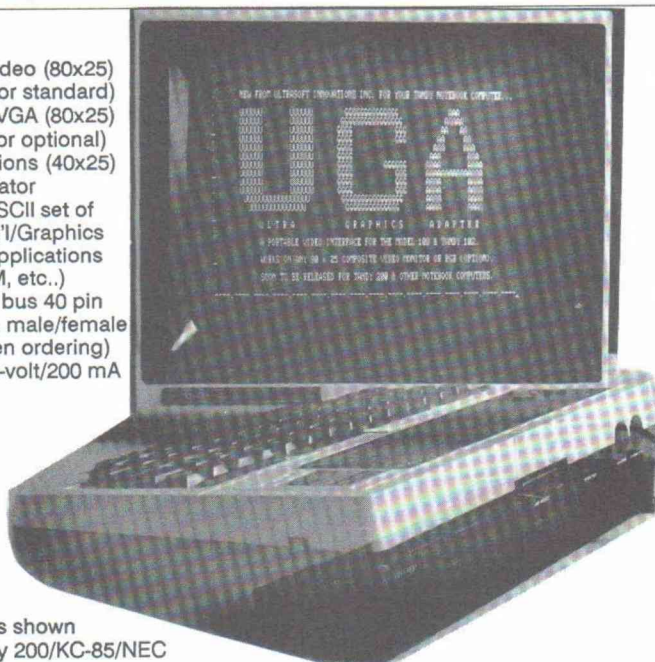
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## DOS AND DON'TS

The above advice, as we've pointed out, is only useful if you can get his attention in the first place. But what if you can't? Don't feel like a failure—it's a common problem. And we have some suggestions.

First: Station the children to whine at the door of the den. Tell them they've got a right to some computer time to play *Space Invaders*. Teach them a few stanzas of "Father, Dear Father, Come Home with Me Now." Depending on your particular brood, this heartrending plea

will either persuade Daddy to come out, or make him more determined to keep the door locked.

But you may not have children (which is likely if your spouse is spending that much time at the computer). In that case, other measures are called for:

Food is always a good attention getter. Remind him that there are other things on menus besides computer program selections. Didn't your mother tell you that the way to a man's heart is through his stomach? Thin food, of course, is best. Try slipping a pizza under the door. Tell him if he opens up, you'll give him the napkins.

If he doesn't respond to any of the above suggestions, you'll have to try something more extreme. Go down to the basement with a flashlight, and find the circuit breaker box. Flip the little black switches back and forth at random. Eventually you'll find the one that shuts off the electricity to his den. This is guaranteed to get his attention, especially if he hasn't saved his files recently. It's drastic ... but this is war.

On the other hand, if violence makes you squeamish, you can try becoming philosophical. Remind yourself that at least you know where he is. And the

ports in a computer are too small to have a girl in every one.

There's also one last-ditch technique that seems to work well with the hacker who isn't too far gone. You must try to bring back the memories that aren't RAM or ROM—remind him of the time when it was dating, not data, that was important ... when his laptop was occupied by something other than a portable computer.

Try putting the kids (if any) to bed early. Then find something in your wardrobe that will serve as a prompt for the desired behavior. Hint: this is usually something sheer, black, and lacy.

This is usually sufficient to remind him—that not all his drives are the floppy kind.

*Sharon Porath is a free-lance writer who lives in Louisville, Kentucky, with one husband, two children and three computers. Her first portable computer folded up into a metal case the size of a small suitcase and weighed as much as if you'd packed an anvil. Portables have come a long way since then, but the problems of living with a dedicated hacker remain the same.*





## COMPATIBILITY:

Tandy 100/102/200/1400; NEC 8201/8300; Olivetti M10, Kyocera KC-85; UNTESTED: Tandy 600

# Odds and Ends

*Dealing with things that don't come in tens.*

*by Gene Bjerke*

**C**omputers are wonderful things. They can't be beat for crunching numbers—as long as the numbers are in the familiar base-10 system. However, not everything is measured in tens. Eggs come 12 to the dozen and minutes come 60 to the hour, for instance. As a film editor, I need to manipulate a lot of numbers, very few of which are conveniently arranged in units of ten.

Two of the most common calculations an editor must make are adding up film footages and converting footage to time. Film has 40 frames to the foot, and time comes in blocks of 60. For many years I had to add footages by hand and rely on tables to convert footage to time. Then came the pocket calculator. This made life somewhat easier, but still required a lot of button punching to convert from base-40 and base-60 to base-10 and back again. But when I bought my Model 100, I knew I had the right tool at last.

**As a film editor,  
I manipulate  
a lot of numbers,  
few of which are  
conveniently arranged  
in units of ten.**

Over time, I developed the program shown in Listing 1. The basic principle is to convert all input to its lowest units, manipulate these, and then convert back for the final readout. Thus, feet and frames are converted to total frames; minutes and seconds are converted to total seconds.

## GETTING THE INPUT

That much was easy. The real problem turned out to be how to do the input. I ended up with three different systems. Since BASIC has a routine, *FIX()*, which separates the whole number portion of a decimal from the fraction portion, I decided to enter

```

1 '          FILM HANDLING PROGRAM
2 '
3 '          Copyright Gene Bjerke, 1986
4 '
100 DIM L$(7): KF=40: KT=36
110 INPUT "16 mm";A$
120 IF A$="N" OR A$="n" THEN KF=16
125 IF A$="Y" OR A$="y" THEN KT=90
130 PRINT "Enter all footage as FFF.ff"
135 FOR I=1 TO 150: NEXT I
140 CLS
150 PRINT "          F)ootage to time"
160 PRINT "          T)ime to footage"
170 PRINT "          L)ength of film"
180 PRINT "          D)ifference of foot
age"
190 PRINT "          A)dd Time
195 PRINT "          S)ubtract Time
200 PRINT "          Q)uit"
210 PRINT "          Choose one ";
211 C$=INKEY$
212 IF C$="" THEN 211
230 IF C$="F" OR C$="f" THEN GOSUB 500
240 IF C$="T" OR C$="t" THEN GOSUB 600
250 IF C$="L" OR C$="l" THEN GOSUB 700
260 IF C$="D" OR C$="d" THEN GOSUB 300
265 IF C$="A" OR C$="a" THEN GOSUB 1100
270 IF C$="S" OR C$="s" THEN GOSUB 1230
275 IF C$="Q" OR C$="q" THEN MENU
280 GOTO 140
299 '
300 '=====Difference of footages=====
301 '
310 CLS: PRINT: INPUT "Start footage -->
"; F1
320 INPUT "End footage --> "; F2
330 R1=(FIX(F1)*KF)+((F1-FIX(F1))*100)
340 R2=(FIX(F2)*KF)+((F2-FIX(F2))*100)
350 R3=R1-R2
360 F=FIX(R3/KF): R=R3 MOD KF

```

Continued

Listing 1. FCALC.BA makes easy work of non-decimal calculations for film editing. Its principles apply equally well to other applications.



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```

370 GOSUB 3000
375 LINE INPUT A$
380 RETURN
499 '
500 '====Footage converted to time====
501 '
510 CLS: PRINT: INPUT "Footage ";F1
520 R3=(FIX(F1)*KF)+((F1-FIX(F1))*100)
525 TS=R3/24
530 GOSUB 2000
540 PRINT "Another?"
545 A$=INKEY$
550 IF A$="" THEN 545
555 IF A$="Y" OR A$="y" THEN 510 ELSE RE
TURN
599 '
600 '====Time converted to footage====
601 '
605 CLS: LINE INPUT " Time --> "; T$
610 GOSUB 1300
620 F=M*KT: R=S*24
630 IF R>KF THEN F=F+FIX(R/KF): R=R MOD
KF
640 GOSUB 3000
645 LINE INPUT A$: RETURN
699 '
700 '====Length of film====
701 '
705 F3=0
710 CLS: PRINT: INPUT "Enter filename: "
;FI$
720 INPUT "Is this a new subject";A$
730 IF A$="n" OR A$="N" THEN 810
740 ' Get new input
750 I=1: PRINT "Start entry, type 'END'
when done"
760 PRINT "Footage for R";I
770 INPUT FT$
780 IF FT$="end" OR FT$="END" THEN 800
790 L$(I)=FT$: I=I+1: GOTO 760
799 '
800 I=I-1: GOTO 930
810 OPEN FI$ FOR INPUT AS 1: I=1
820 INPUT #1,L$(I)
830 IF EOF(1) THEN 850
    
```

Continued

L\$()	List of footages (array)
KF	Frames per foot (constant)
KT	Feet per minute (constant)
A\$	Response to prompt
C\$	Menu Choice
FT\$	Feet and frames (as a character string)

Variables for:

Feet	F, F1, F2, F\$
fRames	R, R1, R2, R3, R\$
Minutes	M, M2, M\$
Seconds	S, S2, S3, S\$, TS (Total Seconds)

FI\$	Filename
RC	Reel to Change
I	Index (generic, non-loop counter)
A	Loop counter

Variables used in FCALC.BA.

footage in the form *Feet.Frames*. For example, 58 feet, 20 frames would be typed in as 58.20. Lines 510-520 show how this was done:

R3 is a variable for total frames, KF is a constant for the number of frames per foot (set at the beginning of the program depending on whether you are working in 16mm or 35mm). The expression,  $\text{FIX}(F1*KF)$ , takes the feet portion of the input and converts it to frames. The expression  $(F1-\text{FIX}(F1))*100$  extracts the frames portion and converts it to an integer. Adding these two yields the total frames, R3.

This works fine for an individual footage number. However, when entering long lists of footage, I need some way to indicate the end of the list. A natural way to do this is simply to type *END* when the list is complete. In order for that to work, the input has to be in the form of a character string. Lines 750-790 show how that works. The strings, which are actually numbers, are stored in an array, L\$(). This array will eventually be saved in your computer as a .DO file.

In converting the numeric character strings to numbers that can be manipulated, I made a basic assumption based on the situation I was in. That was that the footages involved would range between 200 and 400 feet. Thus, there would always be



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Circle 127 on reader service card.

```

840 I=I+1: GOTO 820
850 CLOSE 1: GOTO 930
860 ' Menu
870 PRINT "          C)hange --- D)one"
880 C$=INKEY$
885 IF C$="" THEN 880
890 IF C$="C" OR C$="c" THEN 900
895 IF C$="D" OR C$="d" THEN 1040 ELSE G
OTO 880
900 INPUT "Which reel do you want to cha
nge";RC
910 INPUT "What is the new footage";FT$
920 L$(RC)=FT$
929 '
930 '====Display module=====
931 '
940 PRINT "          ";FI$: PRINT"=====
"
950 FOR A=1 TO I: PRINT "R";A;"..";L$(A)
: NEXT
960 PRINT "-----"
970 F=0: R=0: M=0: S=0
980 FOR A=1 TO I: F=F+VAL(LEFT$(L$(A),3)
): R=R+VAL(RIGHT$(L$(A),2)): NEXT A
990 F=F+FIX(R/KF): R=R MOD KF 'Converts
excess frames to feet
1000 GOSUB 3000
1010 R3=(F*KF)+R: TS=R3/24: GOSUB 2000
1020 GOTO 870
1040 OPEN FI$ FOR OUTPUT AS 1
1060 FOR A=1 TO I: PRINT #1,L$(A): NEXT
A
1070 PRINT "File ";FI$;" saved": FOR A=1
TO 150: NEXT A
1075 CLOSE 1
1080 GOTO 140
1099 '
1100 '====Add time=====
1101 ' Uses M, S from subroutine
1102 '
1110 CLS : PRINT "To get total, enter '=
,"
1120 INPUT "What is the first number";T$
1130 GOSUB 1300

```

Continued

```

1140 TS=S+(M*60)
1150 INPUT "          What is next number";T$
1160 IF T$="" THEN 2000 ELSE GOSUB 1300
1170 TS=TS+S+(M*60): GOTO 1150
1229 '
1230 '====Subtract time=====
1231 ' Uses M, S from subroutine
1232 '
1235 CLS: INPUT "What is the first numbe
r";T$
1240 GOSUB 1300
1250 S2=S+(M*60)
1260 INPUT "          Subtract what number";T$
1270 GOSUB 1300
1280 S3=S+(M*60): TS=S2-S3
1290 GOTO 2000
1299 '
1300 '====Read time and assign to varia
bles=====
1301 ' Input - T$ : Ouputs - M, S
1302 '
1310 I=1
1320 IF MID$(T$,I,1)="" THEN 1340
1330 I=I+1: GOTO 1320
1340 M$=LEFT$(T$,I-1): I=LEN(T$)-I: S$=R
IGHT$(T$,I)
1350 M=VAL(M$): S=VAL(S$)
1360 RETURN
1999 '
2000 '====Display Time=====
2001 ' Input - TS
2020 M=FIX(TS/60): S=TS-(M*60)
2030 S=(FIX(S*10+.5))/10 'Rounds to .1 s
econd
2040 M$=STR$(M): S$=STR$(S)
2050 IF S<10 THEN MID$(S$,1,1)="0"
2060 PRINT "          Time is ";M$;".";S$
2070 LINE INPUT A$
2080 RETURN
2999 '
3000 '====Footage display=====
3001 ' Input F, R
3002 '
3010 F$=STR$(F): R$=STR$(R)

```

Continued



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```
3020 IF R<10 THEN MID$(R$,1,1)="0"
3030 PRINT " "; F$; ". "; R$;
3040 RETURN
```

End of listing

three digits on the left of the string representing the feet, and two digits on the right representing the frames. This resulted in lines 970-990. The expression `VAL(LEFT$(L$(A),3))` converts the three left digits to numbers which are accumulated in the variable `F` (for Feet). The expression `VAL(RIGHT$(L$(A),2))` similarly extracts the number of frames for accumulating in the variable `R`. Since `R` will probably end up with more frames than there are in a foot, line 990 converts the total frames to feet and frames and adds the feet to `F`.

This is all right when you know how big your numbers are going to be. But the input routines for time need to deal with quantities that run from a couple of seconds to over an hour. (Film lengths are counted in minutes; a feature film runs 90-120 minutes.) The most natural way to enter time is in the standard format of *Minutes:Seconds*. Minutes and seconds can vary. If I could find out how many characters come before the colon, I could use that number to separate the minutes from the seconds.

The solution can be found in lines 1310-1350. I created a variable, `I`. This is stepped through the string until it finds the colon (lines 1310-1330). Line 1340 then uses this information to extract the minutes and seconds as separate character strings, and line 1350 turns them into numbers.

### MANIPULATIONS

Once you have the numbers sorted out into their appropriate variables, manipulating them is straightforward. At this point,

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everything is back to base-10. Frames and seconds can be added and subtracted. Dividing total frames by 24 gives you total seconds.

In most of the modules, the actual manipulations are only one line long. All the real work was done in getting the input and assigning it to variables. The final problem was to put the answers into the right units and display them.

### DISPLAY RESULTS

To keep control over the appearance of the display, I chose to convert the answers to string variables.

The time display subroutine (line 2000) shows how this is done. At line 2020 the program turns total seconds into minutes and seconds. Line 2030 rounds the seconds to the nearest tenth. Line 2040 converts these to string variables and line 2050 adds a 0 to the seconds, if needed. Line 2060 prints it to the screen, and line 2070 makes sure it stays there until you hit `ENTER`. The subroutine at line 3000 is the basic display routine for the footage. It is even simpler, since there is no such thing as a fraction of a frame.

There are many times that we need to deal with items that do not come in units of ten. This program was developed to deal with a couple of those areas. Not everyone needs to do the specific job this program was written to do. But the approach used here may be useful in some other application involving non-decimal calculations.

*Editor's note: Tandy 1400 owners should change MENU in line 275 to END or SYSTEM. Also, the higher processor speed requires a longer delay loop in line 135; change the 150 value to 1500 or higher until you find a delay you like.*

-MN





COMPATIBILITY: Tandy 100/102/200

# Take A Quick Trip To California

*A review of Club 100's 50 Great California Games*

*by Bob Scott*

**5** 0 Great California Games is a collection of public domain and shareware game programs for the Tandy Models 100/102/200. This collection is distributed by Club 100—a California-based non-profit club dedicated to Model 100 user support.

The Games collection is available in several formats including MS-DOS, TDD, DVI, Chipmunk drive, and cassette. With the exception of the TDD and Chipmunk drives, all files are stored as ASCII (.DO) files and require loading into BASIC after transfer to the M100.

Let me state straight away that I am not a big fan of computer games. I'd much rather spend my limited free time reading or listening to music than fooling around with games, computer or otherwise. This goes double for adventure games, which are about as exciting to me as guessing random numbers from a hidden list.

On the other hand, I have also been stranded in many, many airports waiting for a flight and wished I had something to do other than read a two-day old *Bugtussle Bugle*. So, although I can appreciate a good diversion, I'm not going to attempt to rate all, or even most, of the gems on the Games disk. I do hope to give you a feel for the topics covered and the attention paid to detail in preparing the disk, however. Correspondence from the hard core game players is invited to cover the relative merits of these programs compared to the holy grail of Nintendo, Atari, et al. (If you can last for more than about ten seconds in *Super Mario Brothers*, for example, you are certainly more qualified to comment than I am!)

There are actually 57 games on the disk. The titles and a brief summary of the object of each game is in Table 1. Of these, I selected the games below to test

completely.

**ADVEN1**—This is a Star Trek adventure with the usual commands ("Go North", "Pick up Phaser", "Put on Velour Shirt", etc.). As the captain of the Enterprise, you awake one morning to find everybody gone and set about solving the mystery. My first guess ("Everybody is watching *Star Trek: The Next Generation* on the hangar deck.") only got me shot by a Klingon. Guess this was written in the period prior to the Federation/Klingon detente. The game seems to be well glued together and relatively consistent.

**CHESS**—This is sorta like the talking dog. It's not that it's done well, but that it's done at all on a Model 100. There is a simple but readable board displayed, and the program does seem to play a fair game. My only complaint is that the board is displayed as an eight-by-sixteen grid on the screen. Although this makes better use of the screen than an eight-by-eight grid would, it causes no end of headaches in trying to decipher how and where the diagonals run. As a result, I had a heck of a time moving my bishops about. All in all, though, a pretty neat game.

**CRASH**—Another adventure, based on surviving a plane crash. In this one I fell off a cliff just before succumbing to boredom... I think a Klingon pushed me.

**DOMINO**—This looked like a fantastic game. I'm not a domino player, but my wife is, so in went the program. The game started with some extremely impressive graphics of the domino table and draw pile. Much to my annoyance, I could not get the program to do anything else. There is no documentation, so I guess the game is supposed to be easy to play. I inspected the program and came to the conclusion that the author had specified several function key responses

as Model 100 graphics characters (in quotes) instead of as CHR\$ constants. These special characters seemed to have been eaten in the BASIC-to-ASCII conversion that Club 100 did, rendering the program useless.

**FENIX**—Semi-interesting shoot-em-up wherein you're bothered by big birds. Reasonably fast action for a BASIC program.

**FORTUN**—Cute version of "Wheel of Fortune," complete with Vanna White. Requires someone to enter the secret phrase prior to the game starting. Very well done.

**MAZE**—Very clever maze-solving program. You see a view from inside the maze, using simple three-dimensional graphics. One of the best M100-specific games I've seen.

**PLANDR**—A fairly fast machine language shoot-em-up with you piloting a space ship over a small, hostile planet. Good use of simulated gravity. Multiple distractions and targets to overcome. My only gripe is that it is really hard to stop playing—not only because it's fun, but because it locks the machine. (Hint: Try the soft reset button).

My overall impression of this collection is good. I was a bit disappointed with the apparent lack of quality control

## Manufacturer's Specifications

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Circle 121 on reader service card. April 1990 PORTABLE 100 19

ADVEN1.BA	Galaxy Trek (Star Trek) text adventure
BANDIT.BA	Slot machine
BJACK.BA	Card game (Blackjack)
BOGGLE.BA	Version of the board game of same name
BRAIN.BA	The famous (?) brain game for the 100
CHESS.BA	Version of chess for 100
CRAM.BA	TRON light cycle arcade game
CRASH.BA	Text adventure
CRIBGE.BA	Cribbage (two-handed)
DEPTH.BA	Battleship-like sub hunt
DOMINO.BA	Graphics based version of Dominos
DRAGON.BA	Graphic adventure
EIGHT.BA	Crazy 8 card game
ESCAPE.BA	Yet another graphic adventure
FENIX.BA	Arcade shooting game
FLIP.BA	Old Chinese dice game
FORTUN.BA	Wheel of Fortune (aka "Vanna in Yer Lap")
FORSC.BA	Four Seasons version of Solitaire
FROGER.BA	Version of arcade game
GEO-ED.BA	Two-player geography guessing game
HAM100.BA	Famous Hammurabi game
HAUNT.BA	Yet another text adventure
HEART.BA	Arcade game
HOUSE.BA	Text adventure
JACK.BA	Blackjack game
JIGSAW.BA	Puzzle of the jigsaw type
LANDER.BA	Moon Lander
LIFE.BA	Two versions of the game of Life
LOTTO.BA	Lotto 6-number picker (Hint: Use Nugent's salary!)
MAZE.BA	Three-Dee maze game
MILTON.BA	Concentration
MIND.BA	Mastermind game
NEWOTH.BA	Othello game
NIM.BA	Computer-based version of old game of NIM
NSUB.BA	Yet another text adventure
PENTOS.BA	Logic-based board game
PING.BA	New version of ancient PONG game
PLANDR.BA	Planet Protector arcade game
PONG.BA	Yet another PONG
PUZZLE.BA	The old "sliding block" puzzle game
QZ-100.BA	Four category True/False quiz game
SHARK.BA	Underwater version of Life simulation
SIMON.BA	Tone memorization game
SKYDIV.BA	Arcade game
SLOTS.BA	In case one slot machine game isn't enough
SQUARE.BA	Solitaire poker game
SUB100.BA	"Get the sub" game
TICTAK.BA	Computer version of kid's game
TOXIC.BA	Arcade game
VPOKER.BA	Poker game
WRDPZL.BA	Word puzzle game
ZOID.BA	Arcade Game

Also included are the following Tandy 200-specific games:

BOMB2.BA	Graphics adventure game
CRMAS2.BA	Graphihcs based board game
GRID2.BA	TRON-like game
OTHEL2.	Yet another Othello version
SOLIT2.BA	Solitaire again
WMPUS2.BA	The granddaddy of all computer adventures (I played this using punched cards at college!)

Table 1. Quick summary of the games included in 50 Great California Games.

that resulted in the domino program not working. There may be other programs so affected, so I strongly recommend getting the *Games* in the TDD or Chipmunk format if possible. These have the games stored as .BA files, which should run correctly.





COMPATIBILITY: All computers equipped with an RS-232C serial port.

# Wireless Telecommunications

## *Reviews of the EST Model 85 Wireless Modem and the QuEST Wireless Terminal*

by Bob Scott

**Y**ou've probably not seen anything quite like these products before, so a bit of explanation is in order. The EST-85 wireless modem is a sophisticated radio transceiver and burst packet terminal node controller (TNC) in one small (5x7x2-inch) package. What it allows you to do is connect two computers, or any other RS-232 devices, *without* wires.

Functioning in a manner quite similar to a telephone modem, the EST-85 translates RS-232 serial data into a format suitable for relay via radio transmission. The data is then compressed into convenient data *packets* and transmitted via an integral radio transceiver. Similarly, incoming data packets from other EST-85's are de-packetized and translated back to an RS-232 data stream.

What does this all mean? Basically, you can connect your computer to another computer or peripheral without running any cables. For example, you could exchange files from one high-rise office to another located across the street without having to tie up a phone line (or having to shoot a wire across with your trusty Ben Pearson). In a like manner, you could access a mainframe or micro-computer from a terminal located anywhere in range of the EST-85, without having to run cable.

The QuEST terminal takes this a step further, integrating an EST-85 and an NEC-8300 (Tandy M100 clone) into one compact, battery powered, laptop package. With it you can access another computer from anywhere within a large factory, for example, without having to find a power plug or a phone jack.

### EST-85 WIRELESS MODEM

As I mentioned, the EST-85 looks and acts pretty much like a standard modem. Although we usually think of modems



The EST modems can also function as repeaters (digipeaters).

being used for connecting two computers together, there's no reason they can't be used for a serial peripheral connection. As an example, you could link your computer to a plotter located across town using a modem. If one or both of the devices you wish to connect are mobile or otherwise difficult to access, then a wireless modem is a good choice. Sample applications suggested by EST are:

- Industrial Control
- Remote Site Monitoring
- Warehousing/Forklift Control
- Portable Inventory/Barcoding
- Robotics
- Intra-Office/Building Networks
- Air-to-Air/Ground Communications

As an engineer, I appreciate items like this which provide a "black box" solution to a problem. All I have to do is come up with RS-232 data; I don't have to become an expert in RF systems or fret about an FCC type acceptance for my overall product. EST has done that work for me.

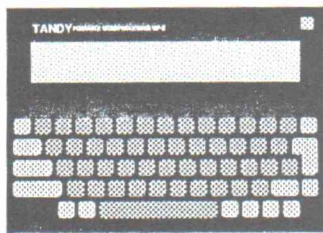
Physically, the modem is unassuming; a black box with an RS-232 port and two banks of DIP switches on the rear. The front panel contains the power/reset switch and four status LED's. The DIP switches permit baud rate/word length programming, receiver sensitivity setting and transceiver frequency selection. The EST-85 can use any of about two dozen frequencies in the 75 MHz band. The EST-86 is quite similar, but uses a higher powered transmitter operating in the 400 MHz business radio band. Both units operate on a single 12 VDC input from a supplied AC adapter. A TNC antenna connector completes the I/O connections.

Also available is the EST-84, which connects to a user-supplied data path (generally a two-way radio) and hence contains no internal transceiver.

Four different antennas are available for the EST modems. They range from a nine inch tall "rubber duckie" flexible whip to a seven foot tall exterior half-wave antenna. EST customer engineers



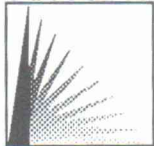
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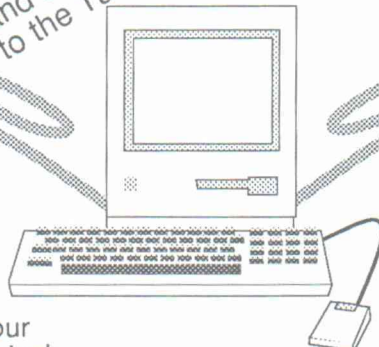


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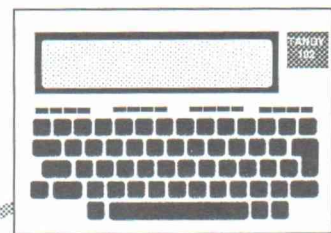
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### Circle 9 on reader service card.

can assist you in selecting the proper model for your needs. Maximum range is claimed to be as much as 15 miles.

The EST-85 is extremely well made. Any device that mixes microprocessors and radios is tough to design due to inherent interference problems. The EST-85 sample supplied was ruggedly built and exhibited minimal self-interference when used with an outside antenna. I was a bit disappointed that no schematics were supplied—a nice thing to have with a specialty device such as this. Additionally, most integrated circuits had the part numbers sanded off, severely limiting the options for modification or repair by anyone but the manufacturer.

Data is relayed using FM Audio Frequency Shift Keying (AFSK) at 4800 bps. Due to the nature of packet communications, the actual data transfer rate is around 3200 bps. Error correction is automatic and continuous. Bad packets are detected and rejected by the receiving modem and retransmitted automatically by the sender.

Devices connected to the modem can communicate with it at all standard rates between 110 and 9600 baud. A 2K buffer is provided and the modem supports both software (XON/XOFF) and hardware flow control. This flow control can

be between the modem and its connected device only or, in the case of software control, the XON/XOFF can be passed between the two distant connected devices transparently, i.e., without the modem acting upon it).

Modems can also be configured as stand-alone "digipeaters" to extend the range of other units. As an example, two offices across town could connect through a third modem (the digipeater) located at a site both offices could "see," such as a high hill or building. Modems used as digipeaters can also perform their normal data relay functions if they are connected to a computer.

### PACKET COMMUNICATIONS

Packet radio is quite different from other forms of radio data relay, such as Radioteletype (RTTY) or Teleprinter Over Radio (TOR). These latter forms are quite similar to traditional phone modems, i.e., both stations are locked in dedicated communication with each other (usually on different frequencies) and dominate the available bandwidth. Two other stations cannot share the radio or telephone channel. This is not the case with packet.

In a packet circuit, each packet transmitter (called a *node*) transmits and receives on exactly the same frequency.

Transmitted packets are quite brief (usually less than a second), and each contains a great deal of *header* information in addition to the actual data that is being sent. Included in the header is the destination address of the data. Packet modems ignore data not addressed to them and acknowledge to the sender receipt of correctly addressed packets. Modems also listen before transmitting to minimize stepping on another modem's transmission. If this condition does occur (called *collision*) each modem waits a random time and then retries its transmission.

Each packet carries a built-in error check code with it that allows the destination modem to determine if it was received correctly.

Normally, modems can only communicate in pairs. Special procedures exist to handle broadcast messages, but these limit data correction and forwarding.

Although the EST modems support addresses between 0 and 255, the actual number of modems sharing a frequency is usually limited by the amount of data being passed, not the number of addresses. As any amateur radio packet enthusiast can tell you, if there two or three pairs of stations passing heavy traffic, a single channel can quickly become saturated. Transmission delays



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☆ **Inside the Model 100** by Carl Oppedahl "...an excellent Guide"—New York Times. A thorough guide to the Tandy Model 100. Learn about A.L. programming; disassembled ROM routines; keyboard scanning; UART, RS-232C, and modem; Clock/calendar chip; Interrupt handling; 8085 instruction set—\$21.95.

☆ **User Guide and Applications for the TRS-80 Model 100 Portable Computer** by Steven Schwartz. 14 ready-to-run programs for business: statistics, graphics, sound, and more. With cassette tape—\$44.95. Buy them separately—the book is only \$21.95; the cassette tape is only \$27.00.

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and requests for retransmissions will follow, dropping data throughput dramatically.

Networks can be constructed by carefully considering who needs to talk to whom and then splitting heavy traffic up into different subnets on diverse frequencies.

## OPERATION

There many, many software controlled parameters that can be set via the modem's RS-232 port. Set parameters can be saved in non-volatile RAM for future use. By varying the parameters, the modem can be made to act as dumb as a piece of wire between the connected devices, or allow all sorts of data editing and prompting. The latter mode is quite useful if the modem is used for chatting from keyboard to keyboard by two operators.

In use, the modems are plugged into the devices (shielded RS-232 cable is recommended) and appropriate antennas reconnected. Communication is established by one unit initiating a connect request to the other. This is accomplished by the command *Connect xxx*, where *xxx* is the address of the other modem. Addresses are user selectable.

In addition to its own control language, the EST-85 can be commanded to emulate a Hayes modem. Most common commands are supported and the most used modem responses are generated. For example, to connect to unit 21, the user (or the computer's software) need only issue the command *ATDT 21*. The receiving modem will generate the expected *RING* and *CONNECT* commands. Any software that can communi-

cate using a Hayes standard modem should work with the EST units.

## THE QUEST TERMINAL:

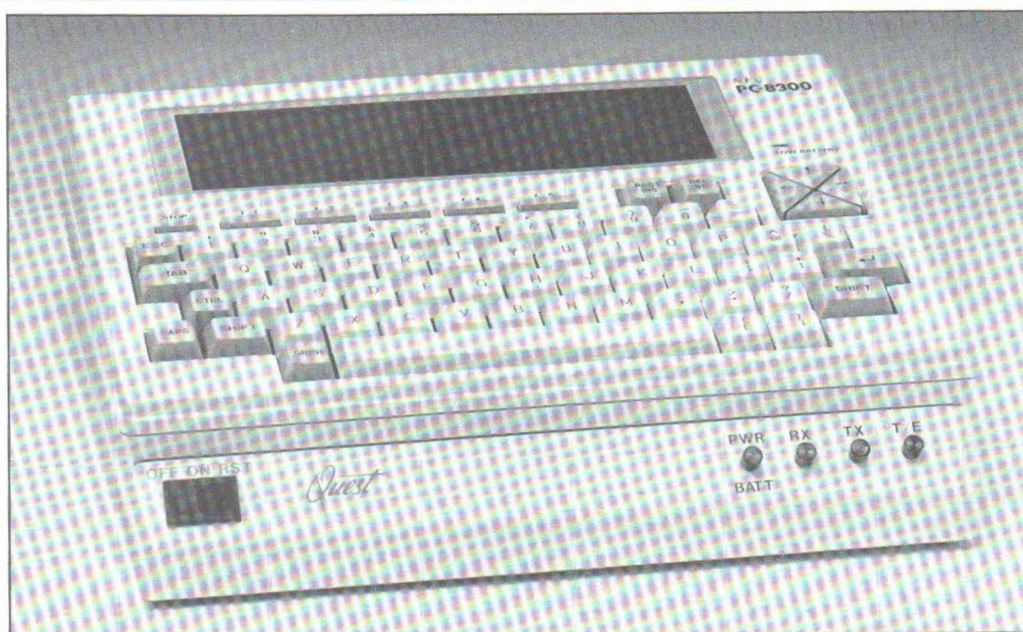
As stated above, the QuEST terminal is a NEC 8300 notebook computer attached to a repackaged EST-85 (or '86 if you prefer) wireless modem. The modem is housed in a rugged (and heavy) steel case attached to the bottom of the computer. This base adds about an inch to the height and depth of the NEC 8300 (which is quite similar to the Tandy Model 100). The EST-85 front panel controls and switches are duplicated on the front of the QuEST. As with the Model 85, this device is quite well built. The interior construction exceeds both commercial and consumer standards—it

reminds me of military spec gear. Power is supplied by an internal rechargeable gel-cell pack with a life of about four hours.

I cannot overstate the quality of this unit. If you drove a fork truck over it you'd probably only have to scrape off the NEC-8300 and replace that. I'd expect the modem to continue working.

The NEC-8300 is unaltered and works as you'd expect. All manuals are supplied for use of the built-in programs, (*TEXT*, *TELCOM*, etc.). The radio modem is accessible from BASIC programs, making the unit ideal for vertical market applications.

The modem base is electrically connected to the computer by an external RS-232 connector and a power cord



*The QuEST provides wireless two-way digital communications between computers or computer peripherals.*



(which supplies the 8300 with power). For grins, I tried connecting *Portable 100's* long suffering Model 102 in place of the NEC-8300 and was quite pleased when it worked flawlessly. I don't know if just the modem section of the QuEST is available, but if you have a M102 you might ask. It reduces the size of the unit considerably (the '8300 is even thicker than the old M100) and is easier to use. The NEC, although pretty flexible in the external storage department, has some operating peculiarities I don't care for.

## SECURITY

Since the EST wireless modems transmit data over the public airwaves, the security of your transactions is at risk.

## I cannot overstate the quality of this unit.

Although the radio frequencies used are pretty easy to intercept, the actual signals are not what I'd call readily accessible. Data interception is probably not a casual likelihood; however it's not impossible, either.

If sensitive data is being processed, you'd be well advised to use a separate hardware or software encryption system.

## TEST RESULTS:

After initial connection of the EST-85 to a Tandy 1400 LT computer (using the supplied shielded RS-232 cable) receiver interference was high enough to prevent proper operation. Shutting down the computer did not reduce the interference, leading me to believe that the unit was generating some internal noise. The receiver sensitivity had to be set on the lowest of the four available settings before the modem operated correctly. Removing the supplied rubber duck antenna and connecting an exterior antenna cleared this problem and allowed use of full receiver sensitivity. The QuEST terminal was also supplied with a rubber duck antenna; however, it had no such problems.

In operation, I made a connection between the test units on the first try. I

fiddled about for a few hours playing with the 1400 remotely from the QuEST. The biggest problem I encountered was traced to the slow LCD display on the 8300. Its inability to keep up with the data transmissions induced serious handshake errors. Reducing the EST-85/Tandy 1400 interface speed to 1200 bps solved that problem.

PROCOMM "host mode" sign-on's and sign-off's were made repeatedly with no difficulties. ASCII and Xmodem transfers were also made between the 1400 and the 8300 without a hitch.

My communications range wasn't spectacular. With a broadband discone antenna (mounted 20 feet high) connected to the EST-85 I could communicate over about a two-block radius with the QuEST terminal. I would expect use of a properly tuned antenna would increase this range greatly; however, any communications to mobile units equipped with flexible whips will probably be range limited.

For fun, I connected the EST-85 to my 2400 bps telephone modem (a stand-alone RS-232 unit). Using this hook-up, I could connect with CompuServe from under a shade tree and send annoying electronic mail to my colleagues at *Portable 100* from the QuEST. What a convenience!

## PRODUCT SUMMARY

This is one of those weird products that you seldom need, but if you do, you need it badly. If you can get a good radio shot from two locations you need to connect, I'd recommend these devices without hesitation.

### Manufacturer's Specifications

EST-85 Wireless  
Modem (VHF)—\$1,495.00  
EST-86 Wireless  
Modem (UHF)—\$2,295.00  
QuEST Wireless  
Terminal—\$2,015.00

Electronic Systems Technology  
1031 N. Kellogg Street  
Kennewick, WA 99336  
(509) 735-9092  
Telex 152514

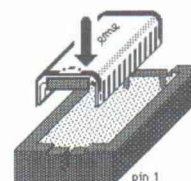


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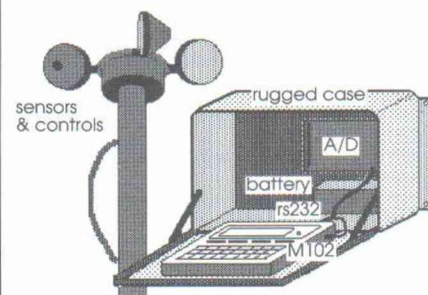
EXTRAM fits into the option ROM socket in the 102/100/200. A 2-pin plug connects EXTRAM to battery and WR lines. It's a snap to install in the 102, slightly harder in the 100/200.

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# Random Tips for *BASIC*

*A few loose ends that Globman dug up and tied down for you.*

*by Paul Globman*

**E**ditor's note: After developing several new software products, Paul Globman has returned from the dungeon. Ongoing projects still prevent him from resuming his CUSTOM 200 column, so he'd like to share special tips, hints, and miscellaneous neat stuff through this new mini-column, GLOBAL PERSPECTIVES. Welcome back, Paul!

-MN

## ERROR TIP

Some BASIC interpreters will not only inform you of a syntax error in the program, but will automatically go into the edit mode for the offending line.

You can make the Model 100 do the same thing by putting the following code into your program:

```
10 ON ERROR GOTO 1000
.
.
.
1000 BEEP: PRINT "Error" ERR "in
line" ERL
1001 IF ERR=2 THEN EDIT. ELSE
LIST.
```

The dot (.) after *EDIT* or *LIST* means "current line," and this is not altered by the *ON ERROR* statement, so it can be used as a BASIC debugging tool.

Be sure the *ON ERROR* statement is not followed by a *CLEAR* statement. Use this code for debugging, and remove it when program is debugged. Syntax errors will invoke the editor for the offending line, and all other errors will simply cause the program to list the offending line for you to review.

## ESC-Y TIP

In a recent conversation I became aware that the escape sequence for cursor positioning was not fully understood (mainly

because the Tandy manuals do not fully explain it).

Page 84 of the *Tandy 200 BASIC Reference Guide* lists a variety of escape sequences for manipulating the LCD screen.

*ESC Y r,c* is listed as the sequence for moving the cursor to row *r*, column *c*. This is rather ambiguous, because *r* and *c* are not clearly defined. Here's how to use this *ESC* sequence...

Row (*r*) can be 1-16 (1-8 on the Model 100), and column (*c*) is 1-40. You must add 31 to to both *r* and *c* before they're sent in the *ESC Y* sequence.

## These two approaches also have the same benchmark times in a 500-iteration loop

Here's a simple example that will put the cursor at row 5, column 5 and print an "X":

```
10 R=5: C=5
20 PRINT CHR$(27) "Y" CHR$(R+31)
CHR$(C+31);
30 PRINT "X"
```

Note the inclusion of a semicolon at the end of line 20 so a carriage return will not be sent to the LCD.

You can use this as a subroutine when trying to adapt a non-Tandy BASIC pro-

gram that uses *LOCATE X,Y* instead of *PRINT@*.

It can further be argued that...

```
10 R=5: C=5
20 PRINT@ (R-1)*40+(C-1), "";
30 PRINT "X"
```

...is the functional equivalent and saves four bytes, so the programmer does have two fairly equivalent options.

These two approaches also have the same benchmark times in a 500-iteration loop, so execution time is of little significance.

This can also be used in machine language (m/l) programs preceding a string to be printed, and the string will be properly positioned. For example:

```
MSG: DB 27,89,32,32,'print this',0
```

This is quite useful in customizing m/l programs for which the assembly language source code is not available. In BASIC it helps bridge the compatibility gap between the Model 100/102 and the NEC 8201/8300, and in m/l it is one less *CALL* statement that must be converted for another machine.

No doubt, there are many potential uses for the *ESC Y* sequence, and for each use it can be argued that another approach will do equally well. I will not dispute that idea. I am simply presenting the use of *ESC Y* and how to implement it, so you have a choice.

*Paul can be reached by modem on CompuServe (72227,1661) and GENie (P.GLOMBMAN). Or by mail at 9406 N.W. 48th St., Sunrise, FL 33351 (please enclose SASE if you're requesting a reply).*



# Living Well With Two Floppies

When hard drives are out of your budget...

by David O. Rowell

**H**ere's a valid operating method for survival(!) with ONLY two 720K floppies and an MS-DOS laptop computer.

BE NEAT!

Don't put DOS on more than one disk. Boot with it, fix with it—do all the DOS chores with it.

Put some real thought into what files must be on the operating disk for the program of choice. Use the disk for that program ONLY.

Make data disk(s) for each program. There is probably room for some overflow from the program disk, as filling 720K would require a LOT of current useful files (unlikely).

Add a line like this to the CONFIG.SYS file on the boot floppy: `DEVICE=RAMDRIVE.SYS 64 128 16`. Maybe change the 64 to 128 if you can spare the RAM. Add /E at the end if you have expanded RAM.

What this gets you is a small RAM disk, which we'll use in a weird way. Your system may call RAMDRIVE by another name such as VDISK or RAMDISK or some such. My RAMDRIVE calls the RAM disk C:, while VDISK called it E:, you need to find out the drive letter to use below.

Now add these lines to your AUTOEXEC.BAT file on the boot floppy:

```
COPY COMMAND.COM C: > NUL
SET COMSPEC=C:\COMMAND.COM
PATH C:\;A:\
C:
```

Now COMMAND.COM is in the RAM disk, and DOS will use it whenever the need arises to consult a DOS copy. No more demands that a DOS disk be inserted in drive A!

If you have the room (and you probably do), add these files to your RAM disk,

too, by adding these lines to your AUTOEXEC.BAT file:

```
COPY FORMAT.COM C: > NUL
COPY XCOPY.EXE C: > NUL
```

You might even squeeze in a small text editor.

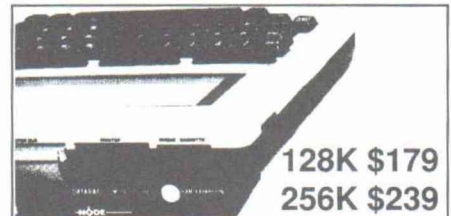
There will be no problems formatting a data disk. Trouble will come only if you format a system disk (FORMAT /S), 'cause there is no source for IO.SYS and MSDOS.SYS, the two hidden system files. In that case, put in the DOS disk, switch to it, and then it will work okay.

With a RAM disk of 64K I can keep COMMAND, FORMAT, XCOPY and a small text editor in drive C on my Amstrad PPC640 (MS-DOS 3.3), available in an instant without devoting floppy space to any of 'em. I have no problems running Lotus' Symphony, usefully, from a two-floppy system. WordPerfect is a pussycat this way, but you do have to swap disks to use the dictionary.

I developed this system on my Tandy 2000 (MS-DOS 2.11) with 384K RAM and two 720K floppies, using it for years that way. With my new AT clone I devote all 384K of expanded memory to a RAM disk, put more files in it, and get along just swell with two floppies.

*Editor's note: Tandy 1400 users should use this line in their CONFIG.SYS files: `DEVICE=RAMDISK.SYS`. No extra parameters are allowed or needed. Tandy 1400's use the entire extra 128K RAM as a RAM disk, and it's not adjustable.—MN*

**Forum is where you can show off your expertise and help your fellow readers! Address your tips, hints, and techniques to: Portable 100, Forum Dept., P.O. Box 428, Peterborough, NH 03458-0428.**



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## **ANOTHER WAY TO SLICE THE PI**

Re: "M100 FLUNKS TRIG!" (DEFUSR, Jan. '90). The Model 100 does indeed work with radians when figuring trig functions. However, rather than use the conversion you gave, it is usually better to go all the way to the definition for radian measures: two pi radians make a full 360-degree circle.

To facilitate this, I frequently store the value of pi under the F3 key in BASIC and then call it up as needed. Page 218 in the Model 100 manual lists the formulas for most of the trig functions. But the Model 100 does not calculate the value for pi as accurately using the listed formula. The books lists  $pi=4*ATN(1)$ , but using  $pi=2*(3d13)$  will give a more accurate value. Interestingly, this will show no difference if tried on the Tandy 102. It is one of the differences in the two machines.

So,  $degrees*pi/180=radians$  and  $radians*180/pi=degrees$ . If I'm writing a program that uses trig functions, I just define  $pi[2*(3d13)/180]$  and  $ip[90/(3d13)]$  somewhere in the initial setup statements and go to it.

You get an A+ for the column. We math teachers are proud of you!

Maybe one of your math readers could write a plain but comprehensive explanation as to why most computers use radians rather than degrees (or grads) to do their internal calculations. Most understand the need of binary notation and accept it. The need of hex is less well understood and less well accepted. But radians are not well understood at all. It would make a good general interest article. (I'd try it myself, but feel others could do better—my understanding of computer trig isn't strong enough.)

By the way, I have written some very

complex programs to help work trig problems for a machine shop application, and would be most interested to correspond with anyone who has some practical experience using the Model 100 in such an environment. We write milling machine programs on the M100 or T102 and then upload them to the milling machines to try them out. If we make extensive changes to the program during a run, we may download the program for storage. I suspect that the M100 could

**We write milling  
machine programs on  
the M100 and then  
upload them  
to the equipment  
to try them out.**

even run the entire operation if some enterprising person were to design a simple interface using LED's driven by the printer port that would communicate with the many older Numerically Controlled machines that used paper tape as the operating media.

**R. Jim Seibert  
1308 126th SE  
Everett, WA 98208**

Thanks, R. Jim! That will help those who need maximum accuracy. ('Twas a tad over my head in spots, but after deadline I can study it some more!) Your proposal for an article on computer math-hacking is interesting. If anyone wants to tackle it, we'd be happy to receive it.

Thanks for the A+! I'm much more comfortable with binary and hex than with that "Pi are square" stuff. (I always thought pi are round—cornbread are square!) Glad you were there to help!

-MN

## **5-SPACE TAB**

How about a BASIC "patch" to let me change the tab to different values in TEXT in my Model 100? The TEXT tab is preset at eight spaces, but most of the time I want five. I use the Ultimate ROM II, which I think merely augments TEXT, so maybe a patch to TEXT will work with it. Have you heard of such a fix, or is there a POKE I can do to change it?

By the way, I typed in MAYDAY.BA as soon as it came out. It already saved my day once! I run MAYDAY, a BASIC program that gives me "bytes free" and directory listing with F6 and F7 in TELCOM, and the Ultimate ROM II. The combination of these is wonderful!

If I only had a TAB patch ...

**Jim Berg  
Greenville, SC**

The real TAB character is a actually a single character (ASCII 9). When the Model 100 encounters one, it displays it as 8 spaces.

One feature of my HOTKEY program (Sept. '88) was a function to insert actual spaces equivalent to a 5-space tab. It worked well with version 1.22 of Ultimate ROM II, but not with later versions, since changes were made in the ROM code. In those cases, you must turn HOTKEY off before using the



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UR-2 and can turn it on again afterward; you just can't use them together. I haven't had a chance to go back and make HOTKEY compatible with various versions of UR-2. (Sorry!)

To get HOTKEY, you can type in the listing in the magazine, download it from our Portable BBS, or get the Sept. '88 P100-To-Go disk.

-MN

### PACKET-TEAR

In the Jan. '90 ROM WITH A VIEW you wanted all hams to register with you. My main areas of interest include: HF/VHF packet, RTTY, CW, DX (SSB, packet & RTTY), USAF MARS, and HF/VHF traffic nets.

I have been using the Model 102 with the AEA PK232, but lately I have been having a small problem with the M102. When I try to enter the Term mode I get an almost steady beep. Has anyone else had these problems or any suggestions?

Vollie Miller WB4TDB/AFA2MZ  
Dickson, TN

Well, Vollie, if you're as dumb as I am sometimes, maybe you inadvertently set your TELCOM stats to Mxxxx, the M meaning you selected the internal modem rather than the RS-232. That's what caused me to pull my hair out for a few hours recently, until I discovered what I'd done!

-MN

### NO NODOZ

I contacted a local Radio Shack store concerning the Tandy 1400 "sleep" override, using NODOZ.SYS, as mentioned in ROM WITH A VIEW (Portable 100, Jan. '90). They, in turn, contacted a Radio Shack Computer Center and a service center, who were knowledgeable of the program but did not have it and could not identify a source. Please advise.

Raymond J. Isaman, Jr.  
Olean, NY

Contact Tandy's Computer Customer Service Group at (817)390-3861. Normally, that shouldn't be necessary. The Tandy service center should have been able to handle it.

-MN

### D/VI ROBBERY?

It took receiving an IBM double-sided floppy to learn that the Model 100 Disk/Video Interface (D/VI) owners "WERE ROBBED!"

**Although the D/VI  
is wired to use  
double-sided drives,  
the unit is  
programmed only for  
single-sided drives.**

Case in point: I had just finished writing a small article on using one double-sided drive as two with the D/VI, when I did a little circuit tracing on the D/VI motherboard. On a standard drive card edge connector, contact #32 (second from the right when facing the drive from the back) is used to select which side of the disk to read or write. Careful tracing on the motherboard of the D/VI shows that a line from pin #14 of the 1793 drive

controller chip (M26, this is the chip that actually does all the real work) goes to pin #10 of chip M16 (a 74LS174 IC chip with six D-type flip-flops, pin #10 is connected to flip-flop #4, input #4). Output Q4 (pin #9) of the same chip leads up to pin #9 of chip M10 (a 7416 hex inverter; this is inverter #4's input), and the output (pin #8) comes out to pin #32 of CN2 (the Molex connector for the drive cable.) Translation of all this technicalese: the floppy disk controller chip is correctly wired to the Molex connector that goes to the disk drives to support double-sided drives.

In other words, although the D/VI disk controller is wired to use double-sided drives, the unit is sold with, and programmed to use, only single-sided drives. At first look, it appears all one would have to do is modify the software and insert double-sided drives to double the D/VI's capacity. Does anyone know the part number for the Disk/Video Interface Service manual?

Stephen Griswold  
Canton, CT

I would imagine that Tandy made their decision based on the fact that the code for single-sided drives is simpler, plus single-sided drives cost less in the market, thus reducing significantly the final cost to the end-user. Considering how poorly the D/VI sold in the first place, it would only have been worse if the retail price had been another \$150 higher.

As with all Tandy computers, the service manual uses the same part number as the equipment it describes, except the letters "MS" are added to the beginning of the number, i.e., MS26-xxxx. The user manual, the one that normally comes with the equipment, uses the same technique with the letters "MU."

-TK





# Club 100: A Model 100 User Group

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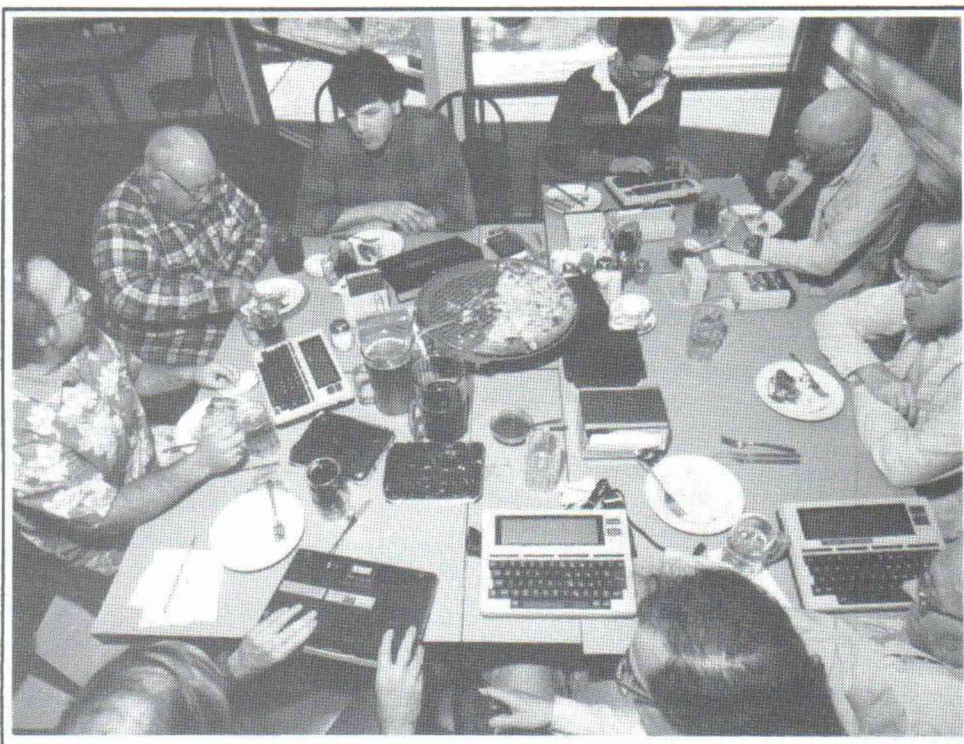
Of our over 10,000 registered members, few use their laptop in the exact same manner. There are, however, items that many of us use and love. Among these are: Lapdos, TS-DOS, The Ultimate ROM II, and ROM2/Cleuseau--all by Traveling Software.

Traveling Software discontinued their laptop line but, due to our long-standing dedication to laptop support, Traveling Software allowed our club the rights to revive and continue their laptop products. This is exciting news, indeed.

Others, needing our expertise, asked Club 100 to handle their items, as well. RAM chips and RAM Expansion Modules by American Cryptronics, laptop to Mac connections by Cabochon, and specific items by individuals, like WP2DOS for connecting the WP-2 computer to DOS machines, and the new, SuperStar programmer collections. (Attention programmers and manufacturers: we want to hear from you.)

If you own a Model 100, 102 or 200 computer, you are already a Club 100 member but may not be on our mailing list. Get on the list and receive our latest catalog of offerings and activities.

Welcome to Club 100... -Rick-



A scene from one of our monthly meetings...

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## WP-2 128K Memory Expansion

MicroMime has released a 128K memory expansion kit for the new Tandy WP-2 wordprocessor. The memory upgrade provides four times the document storage of the Tandy "Internal 32K RAM Expansion." The MicroMime upgrade provides quadruple the document storage of the standard 32K part. This memory, like the smaller Tandy part, is configured as a RAM disk.

A key feature of the MicroMime memory expansion product is that it features the same low-power characteristics as the smaller 32K part. Battery life will be unaffected even though you

have four times the document storage.

The 128K memory kit comes with installation instructions and 90-day warranty. It joins its sibling, the MicroMime 32K memory expansion kit for the WP-2.

The cost of the 128K WP-2 memory expansion kit is \$79 postage paid (CA residents add 6.25% sales tax). The 32K part is \$17. To order, or for more information, contact MicroMime, P.O. Box 28181, Santa Ana, CA 92799 or call/fax (714) 545-1765. Their Compuserve address is 70346, 1267 and MCI Mailbox is 200-3496. *Or circle 62 on the reader service card.*

## Easy-to-use Acoustic Coupler

The Telecoupler provides an "acoustic" interface between a modem and a telephone and works equally well on analog or digital systems. It can be used anytime a telephone handset is available, but its primary use is when an RJ11 jack is difficult or impossible to access. Utilizing state-of-the-art sending and receiving elements and advanced signal processing technology, the CP+ Telecoupler provides convenient, reliable high speed (2400 baud) modem communi-

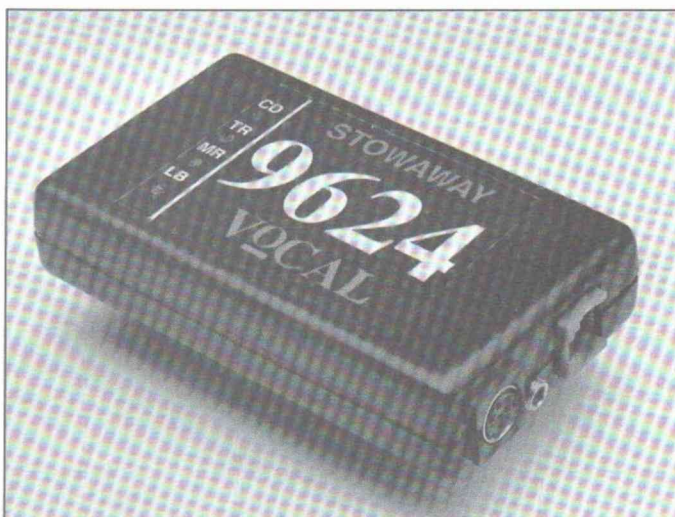
cations. With its won internal batteries and RJ11 plug, it connects to any modem—no special connectors required. It weighs only 9.1 ounces including its batteries, which provide 7-13 hours of transmission time.

The list price for the Telecoupler is \$149.95. Contact Computer Products Plus at 16351 Gothard St., Huntington Beach, CA 92647, (800) 274-4277, for more information. *Or circle 64 on the reader service card.*

## Quick Work With the Quickbrick

Systems Peripherals Consultants announces the new Quickbrick, an external portable hard disk drive for laptop computers. The Quickbrick comes in 20 and 40 Mb formats, 68 ms access time, and 7 watt power demand. Each weighs 2.2 pounds and measures 1.75" x 4.5" x 6". Prices for the QuickBrick 20 and 40 are \$495 and \$695 respectively. Also available is an op-

tional battery pack (includes recharger and case) for \$145 and a BridgeCard (for attachment to XT or AT desktop computers) for \$145. For more information contact Systems Peripherals Consultants, 7950 Silverton Ave., #107, San Diego, CA 92126, (619) 693-8611 in CA, (800) 345-0824. *Or circle 61 on the reader service card.*

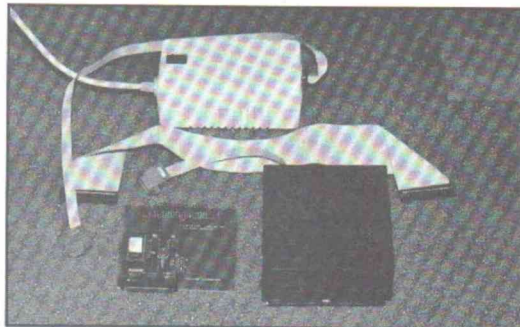


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files or popular graphic formats. The advanced software, included with every Stowaway 9624, also allows the viewing and printing of received facsimile messages and supports popular printers such as Epson and the HP LaserJet. The Stowaway 9624 FAX/Data Modem provides Group III compatibility at 9600 baud with auto fallback capability. The Stowaway 9624 is backed by a one year warranty and carries a suggested list price of \$645. For more information contact Vocal Technologies at 3032 Scott Blvd., Santa Clara, CA 95054, (408) 980-5181. *Or circle 63 on the reader service card.*



*Plug-in-and-run kit includes the drive, adapter card, powersupply and leather carrying case (not shown).*



continued from page 7.

Reemer. For what it's worth, it was an accident."

"Well, it seems it was a lucky accident for me." He looked up at me. "My projections show that with Reemer gone, people are going to start dressing how they want, working the hours that they want, and using the equipment that they want—all with a boost in morale that will lead to a dramatic increase in personal productivity and department achievement. I could have seen that for myself if I hadn't been so wrapped up in The Project."

"The Project?" I repeated.

"OZ/2. The next generation operating system. It'll let you do about a hundred different things at once. All you'll need is a few thousand dollars of equipment, a real big, strong desk, a college degree in Computer Science, a few—"

"Look, Gil," I interrupted, "I'm sure that this is all very fascinating, but I'm tired of hearing about computers that cost more than airplanes." I reached into my backpack and pulled out the Tote-02.

"I'm just a writer. This is all the machine I need." I set the machine down on his desk.

He looked at it, then he looked up at me. There was a light in his eyes that hadn't been there a moment ago. "Why didn't you tell me sooner? Now I understand why you've been sent to us. It's a sign—I'm on the right track."

"A sign?"

He smiled, and reached up to his collar with both hands. He lifted a fine chain worn under his shirt up over his head and held it up. A small key dangled from it. He used the key to open a hidden drawer on his desk. He reached into the drawer and withdrew something that he set on the desk in front of him.

It was another Tote-02!

He looked at it lovingly. "You know, I still use this more than any other machine around here."

"Then why keep it hidden?"

"I've got a Board of Directors to answer to."

"I still don't get it," I said.

He spread his arms expansively. "This corporation takes in millions of dollars every month. There's nothing beyond our financial reach. What would happen if the CEO, yours truly, turned his back on the platforms that support this empire and started using a \$500 computer? The Board would think I'd lost my mind, and one way or another, I'd be out. No, the only way I'll ever be able to use this freely is if everyone else starts using them."

He lowered his voice and leaned towards me conspiratorially. "That's what The Project is all about. You've been hearing about OZ/2 for years now, right?"

"Right," I agreed.

"Trust me—it'll never happen. OZ/2 is really my own secret way to restore balance to the computer world. You see, years ago I made the wrong decision. I sought to plunder the purse of the Power User. Every year, it was bigger and bigger versions of our products. More complexity, greater learning curves, extravagant hardware requirements. And the world followed me along this mad path—after all, I was the Wizard!"

He shook his head sadly as he continued. "But I was turning my back on my roots." He petted his Tote-02 fondly. "Then, one day I had a vision. A Zen moment. And I understood what I had done—and how I could correct it."

"Thus, OZ/2. A dog and pony show that serves to distract the Board and the computer press while I secretly develop EmeraldROM for the Tote-02! A single plug-in ROM chip, it will feature word processing, spell checking, a spread-

**And each module will  
be so easy to use,  
so intuitive, that  
we're not even going  
to have to ship docs  
with the chip!**

sheet and data base, an outliner, advanced telecommunications with automated E-mail and fax capabilities, appointment management, presentation graphics, laser printer output and a few other goodies. And each module will be so easy to use, so intuitive, that we're not even going to have to ship docs with the chip!"

"Meanwhile, as I'm putting the finishing touches on this, the bug-ridden and undersupported OZ/2 platform will be driving power users crazy with frustration and disappointment—and when they snap from the strain, they'll be ready for the simplicity and serenity of the One True Machine. The Tote-02. And my EmeraldROM chip, of course."

I was blown away. It struck me as a brilliant plan—except for one fatal flaw. "EmeraldROM sounds like a fantastic chip. But how can a user take advantage of all those features with just a 32k workspace available?"

He looked happier than a Playboy photographer. "That's the best part—I've developed a real-time hyper-compression algorithm. Any data you create is shrunk and/or expanded on the fly. Without the user lifting a finger, my routine will take that 32k workspace and cram 1 full megabyte of data in it!"

I was on my feet, heart hammering, head spinning at the possibilities. I was giddy as I thought about my Model 102 transformed into this miraculous ...

Hey, wait a minute.

"Say, uh, Gil ... just how much is this chip going to sell for, anyway?"

"Oh, about ten thousand dollars," he answered casually.

"TEN THOUSAND DOLLARS!" I thundered, the fantasy of my enhanced 102 fading faster than the memory of a Dan Quayle speech. "Ten thousand dollars? You'll never get that much for a 32k ROM chip, I don't care what's on it. You, my friend, are dreaming. You're dreaming. You're dreaming ... You're ...

\*\*\*

"... dreaming, Michael."

I opened my eyes. Liz, my beautiful wife, was standing over me, shaking my shoulder lightly.

"Huh?" I said cleverly as I looked around. I was still on my front porch, curled up under the blanket, sitting in the chair from which I had been watching the storm.

The whole thing had been just a dream! I couldn't believe it. It had seemed so real ...

Liz was saying something.

"What, hon?" I asked.

"I said, you got a phone call while you were sleeping." She handed me a slip of paper and went back into the house.

In the soft glow of the porch lamp, I looked at the message. It said, "Mike Nugent called—wants to know if you have any ideas for your next column."

Heh, heh, heh.

by Michael Daigle





# The Portable 100 Classifieds

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also customize 5 BASIC programs. \$49.00+\$2.00 (S&H). Software by Stefens', 1731 William Ct., Little Chute, WI 54140.

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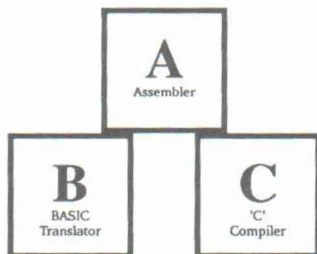
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passed our highest expectations for quality and clarity."

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## 1985

**January:** DG has the One to Go, *Model 100 Proves Itself in the Jungles of Nicaragua*, Meet the Dulmont Magnum, *Telecommuter: Software that's Ingenious*, *Kyocera's Three Aces*. End Telephone Tag with M100's.

**February:** NEC Wishing upon Its Starlet, In-Depth Reviews of HP 110, Sharp PC-5000, *Chattanooga Systems AutoPen, AutoPad, Trip*.

**March:** Reviews of Epson Geneva and Osborne 3, Comparisons of Two Thermal Printers (Brother HR-5 and Printex TH-160); *The Pluses and Minuses of Batteries*, *M100 Data Acquisition*.

**April:** Reviews of Sord IS-11, Sharp PC-1350, *DISK+*, *T-BASE*, and *Roadrunner*; *Free Software: Textpro*, Technology Transfer Damming the PICO Pipeline to Russia.

**May:** Review of DG1, Which Spreadsheet Should you Buy? Servicing Picos, LCD Screens in Color, Federal Express.

**June:** Reviews of *Tandy 200, 2.2 Companion*, and *T-Backup*, *M100 File Transfer*; Wrangler improves the Odds with Sharp PC-5000s, Dow Jones News/Retrieval On-line Database, *Courtroom M100's*.

**August:** Reviews of Datavue 25 and *Touchbase Modem*; QuickTrip Convenience Stores More Efficient, Tracing Tribal Roots and Translating the Bible in Jungles of Papua New Guinea.

**September:** Reviews of HP Portable Plus, *WriterOM*, *ThinWrite 80 Portable Printer*; A Flat Mac, *M100 Meets Challenges at Woods Hole Oceanographic Institute*.

**October:** Reviews of Kaypro 2000, *T-View 80*; Computerized Fire Department, Stretching the limits of Telephone and Computer, *BASIC translation Tactics*.

**November:** Reviews of Bondwell 2, NEC 8027A Printer, *CQ Haste*; *PICO Formatter*, Search and Rescue Via Computers, Industry Views from an HP Exec.

**December:** Close Look at Ericsson Portable and *TMPC (time management software)*, Travel Tips, Tricks for Traveling, *Dialer Program*, *Project management with the M100*.

## 1986

**January:** Reviews of Gridcase 2, Access, Word-Finder, and Prospecting, CP/M and MS-DOS, *Security Program*, Can Universities Cope with Picos? News from Comdex, *Jazz up your LCD*.

**February:** Reviews of ZP-150, and LeScript Word Processing; *Stevie Wonder Inspires Stardom in M100*, Can Universities Meet Expectations of

Computer-literate Students? *Cold-Start recovery, Personalized Form Letters*.

**March:** Reviews of Panasonic Exec.Partner, Lync 5.0, and *Hardwire*; University Rethinks its Tasks, Picos in Medicine, *Auxiliary Battery Packs Spell Independence*, *More Muscle for the M100*.

**May:** Reviews of Toshiba T1100, IBM PC Convertible, Casion FX-7000G Calculator, SG-10 Printer, *MIKEY*, *Appointment Manager*, and *FAST*, IRS Crowns Zenith's Z-171, Handhelds in Restaurants.

**June:** Reviews of Zenith Z-171, *LapCoder*, *SuperROM*, *LAPDOS*, and *BlackJack*; Go Shopping at PC in Rochester, NY, OM10 RAM Map (pt 1), A Tale of Two City Councils.

**July:** Reviews of Bondwell, ROM2, Letterjet HS-80, and Sidestar.; Electronic Cottage, Taking Stock of Investment databases II, NEC 8201A's LCD, OM10 RAM Map (pt 2)..

**August:** NH's Governor discusses Laptops, PC-7000 from Sharp, Choosing your test-oriented Database manager, *Model 100/200's Lend a hand to Job Seekers*, NEC-8201A's Communication Connection.

**October:** Reviews of Toshiba 1100+, New Word, *Diconix Printers*, Fortune 500 Picos, Interview with DG Exec's, Desktop publishing with Picos.

**November:** Picos in Libraries, *Clever M100 Combinations*, *Exploring TPDD Part I*, Reviews of Datacomputer 2.0, *TPDD*, *TS-DOS*.

**December:** Picos on Wall Street, Connecting to On-line Databases, Telephone Problems, *TPDD Part II*, Reviews of *Cleuseau*, *French/German Tutor 3*, *Pocketsize Modems*; 1986 Article Index.

## 1987

**January:** Book Publishing With a Pico, *Frame-work in a Pico*, Review of Right-Writer, JK Lasser's Money Manager, HP+Enhanced, Electric Webster, *Disk Power*, Pico's Computer Buyer Guide.

**February:** *Poor Man's Idea Processor*, Macintosh-Pico Connection, *M100 Cursor key alteration*, Handhelds: HP-18C, Langenscheidt 8000, TI-74, Reviews of Sord IS11-C, *Lets Play Monopoly*, \$100 letter quality printer.

**April:** Browsing the Boards, Writers & Portables, KTI products, Badminton & NEC, Reviews of *Inside the M100*, *TTXPress Printer*, *PCSG Business Analyst*, Datapad 84 Zoomracks & ECFS.

**May:** Doctors with Portables, *Text to printer*, Hitting the Board **OUT** of PC Convertible Add-ons, Holiday & Shout, *M100 memory Expansion*.

**June:** Lawyers & Laptops, *Personal Management System*, *M100/Mainframe Terminal Prog.*, Reviews of Wang Portable, *Search*, *Sprint* and *Supercalculator*, *Best of Compuserve* book, Chess-to-go.

**July:** Programming in the Portable Environment, Sysop interview, Talking portables (pt1), Portable Computer Buyer Guide, Reviews of *TS-Random*, Software Carosel, Popcorn & the Hyperion.

**August:** NEC 8201 tokens, Laptops in Movie filming, Talking Port **OUT** Reviews of Casio FX-8000G, Tandy 1400LT, and *System 100*.

**September:** *English Teachers use Laptops*, *Picos in Class*, *D* **OUT** *emplates*, *Picos in the Oil Patch*, Reviews of *ColorPro*, and the *Sportster 1200 modem*.

**November:** *Control That Printer*, *Academia & Laptops*, Laptops on Capital Hill, Starlet Secrets, Reviews of Psion II, *DVORAK keyboard*, & Spark.

**December:** Global Laptops, Starlet Software, Toronto Blue Jays & GFiD, *NiCd Notes*, Review of IMC LCD-286, 1987 Article Index.

## 1988

**January:** Portable Computer Cellular Communication, Laptop Roundtable, Pico Portable Guide. Reviews Telemagic, Direc-Tree Plus, SchwabLine, Quotrek.

**February:** TenniStat, Flexibility of Form, T200 and T16. Reviews Eclipse, T1100 Hard Drive.

**May:** Handhelds Fight Crime, A Pico in China, Compaq Port. III, Datavue Snap, Fax hits the Road, HP Portable Vectra, T1400LT, Three Pocket Modems, Close-Up's Customer & Support.

**June:** Multispeed in the Tropics, *Monitoring Alkaline Batteries*, PSION and Mass Storage, Datavue Spark, Smith Corona Portable Word Processor.

**July:** Toshiba on the Road, *Diskette Ratings*, *Metered NiCd Manager*, Procomm on the NEC, WordPerfect 4.2 on the T1000, Sales Ally.

**September:** Laptops & the Learning Disabled, WordPerfect 5.0, Dynamac EL, HP-71B, WordPerfect Executive, Webster's New World Writer II.

**October:** Portables at Sea, Macintosh Navigating, Piloting and Celestial Progs, NEC-8300, Compaq Port. 386, File Transfer, Golden Parachute.

**November:** European EMAIL, New Tricks for your Cassette Recorder, Pico Pillows, Amstrad PPC-640, Selecting the President, Sales Power, Sales Strategy, Office Writer goes Light.

**December:** *FASTECH*, Automating Your Sales Force, Al, ScriptWriter, LiteDrive, Homeword Plus, VP-Expert.